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Confidential

CXDI-60G/60C

Service Manual

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Service Manual Introduction

This service manual belongs to a series of after-service guides Canon Inc. publishes as part of its comprehensive product quality guarantee program.

This service manual consists of nine chapters; “General”, “Installation Manual”, “Functions”, “Repair Guide”, “Parts Catalog”, “Troubleshooting”, “Service Manual Report”, “Tools” and “Appendix”. It describes an overview of the product, its functions, product configuration, installation procedures, dimensions, specifications, and notes.

If the product undergoes a large modification, a revised edition of the service manual will be sent to you. In other cases, a service manual report will be sent to you to update the manual.

Note 1:

This service manual is published by Canon Inc. in accordance with Article 6 (Furnishing the Referring Materials) of the Service Assignment Contract it has concluded with your company.

Note 2:

This service manual is the property of Canon Inc. and the company may seek to have it returned, depending on the circumstances. You are expected to keep it until then.

Note 3:

You inquiries, suggestions, etc. about the contents of this service manual should be addressed to:

Medical Equipment Technical Service Dept.
Canon Inc. Headquarters
30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501, Japan

Caution Regarding Service

This product was precisely assembled under strict manufacturing process control. There are several hazardous locations inside of this product. Careless work while the cover is removed can result in the pinching of fingers or electrical shock. Please perform the work with the following important points in mind:

1. **Setup, Repair, and Maintenance**

   In order to ensure safety, the best performance, setup, repair, and maintenance work can only be performed by technicians who have received service training specified by Canon Inc. If there are order required certificates or restrictions specified by the law or ordinances, those regulations of the country must be observed.

2. **Removing the external cover**

   When removing the cover during maintenance, repair, etc., perform the work after switching the power off. Never touch the device with wet hands, as there is a risk of electric shock.

3. **Fuse**

   When replacing the fuse, first resolve the reason for its failure and then replace the fuse with the specified type. Never use a fuse other than the specified type.

4. **Connecting the grounding wire**

   The provided ground wire must be connected to the ground terminal indoors. Make sure that the device is properly grounded.

5. **Alternation prohibition**

   Never modify the medical device in any way.

6. **Waste control**

   The service provider is responsible for the disposal of used service parts, packing material, etc. resulting from the setup, repair, or maintenance of the medical device. However, the customer is responsible for the disposal of the medical device. Disposal activities must follow the regulations (especially controlled industrial waste) of the country where the device is used.

VORSICHT

Befolgen Sie die unten angegebenen Sicherheitsanweisungen.
Mißachtung kann zu erletzungenoder Unfällen führen.

1.Zerlegung, Zusammenbau, Einstellung und Wartung

Zerlegung, Zusammenbau, Einstellung und Wartung dürfen nur von einem Wartungstechniker durchgeführt werden, der an einem von Canon vorgeschriebenen Wartungslehrgang teilgenommen hat.

2.Entfernen von Abdeckungen

Schalten Sie unbedingt die Stromversorgung des Instruments aus, bevor Sie die Abdeckungen zwecks Wartung und Reparatur entfernen.
Vermeiden Sie auch eine Berührung des Instruments mit nassen Händen.
Anderenfalls können Sie einen elektrischen Schlag erleiden, der zum Tod oder schwerer Verletzung führen kann.

3.Sicherung

Wenn die Sicherung ausgewechselt werden muß, schalten Sie unbedingt die Stromversorgung des Instruments aus, und beheben Sie die Ursache für das Durchbrennen der Sicherung.
Ersetzen Sie die Sicherung nur durch den vorgeschriebenen Typ.
Anderenfalls kann es zu einem Brand oder elektrischen Schlag kommen.

4.Erdleiter

Erden Sie das Instrument unbedingt an einer Schukosteckdose.
Anderenfalls kann es zu einem Brand oder elektrischen Schlag durch Leckstrom kommen.

5.Umbau

Jeder Umbau des Produktes ist strengstens untersagt, da dies zu einem Brand oder elektrischen Schlag führen kann.

Caution Regarding the Setup

According to “IEC60601-1-1:2000”, devices installed in the patient environment are restricted to “electric medical devices conforming to IEC60601-1”.

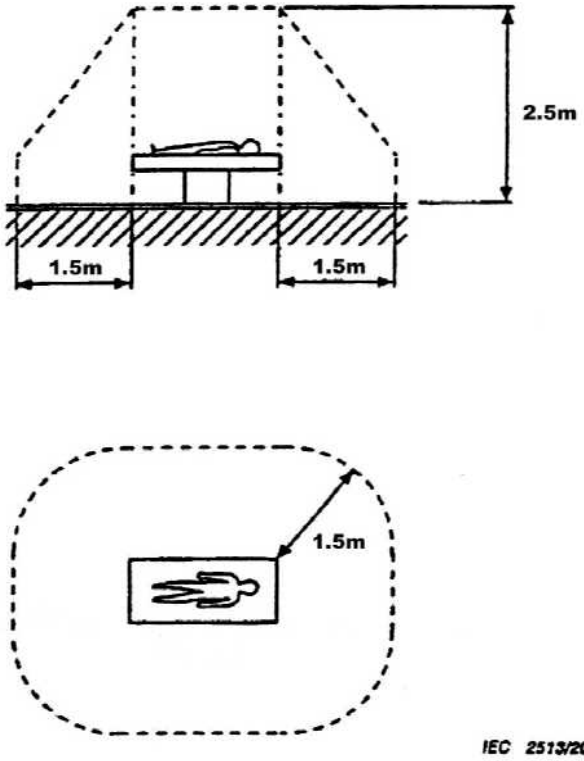
The Control PC and operation unit are classified under the data processing device standard (IEC60950), therefore these items should not be installed in the patient environment.

The patient environment described below is an example cited from “IEC60601-1-1:2000” – the measurements are only guidelines. However, the “IEC60601-1-1:2000” example must be treated as the standard.

Therefore, the Control PC and operation unit must be installed in a location further than the measurements below (outside of the patient environment).

***Areas where the patient moves (not only during imaging but when entering and leaving the room, etc.) are also considered as part of the patient environment, therefore the installation location should be determined upon consultation with the user regarding areas outside of the patient environment.**

Example of patient environment



Note: These measurements are only guidelines.

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CXDI-60G/60C

1. General

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1 General

CXDI-60G/60C represents a compact cassette model that enhances user convenience in cassette-based digital radiography. It is used in combination with Control computer (CXDI-C3, CXDI-C3S, FC-24VE, FC-E21A or the general computers with equal performance).

The sensor cable is organized into two parts. The one is a sensor cable S150-60 (imaging unit side) and the other is a sensor cable P630 (power box side). Two cables are connected with the connectors. It adopts the detachable connector, which is compatible with the CXDI-55G/55C, allowing the use of two sizes portable flat panel detector.

The vertical scanning drive (Drv-IC) and the data read out (Amp-IC) are located in one side of LANMIT. Image data is read out from one direction.

The appearance of the CXDI-60G is almost the same as that of the CXDI-60C, but their fluorescence substances that convert X-ray into visible light are different.

CXDI-60G

CXDI Software	Ver.7.0 and later
Serial number of CXDI-60G imaging unit	100001 and later
Serial number of CXDI-60G imaging unit (non-logo model)	300001 and later

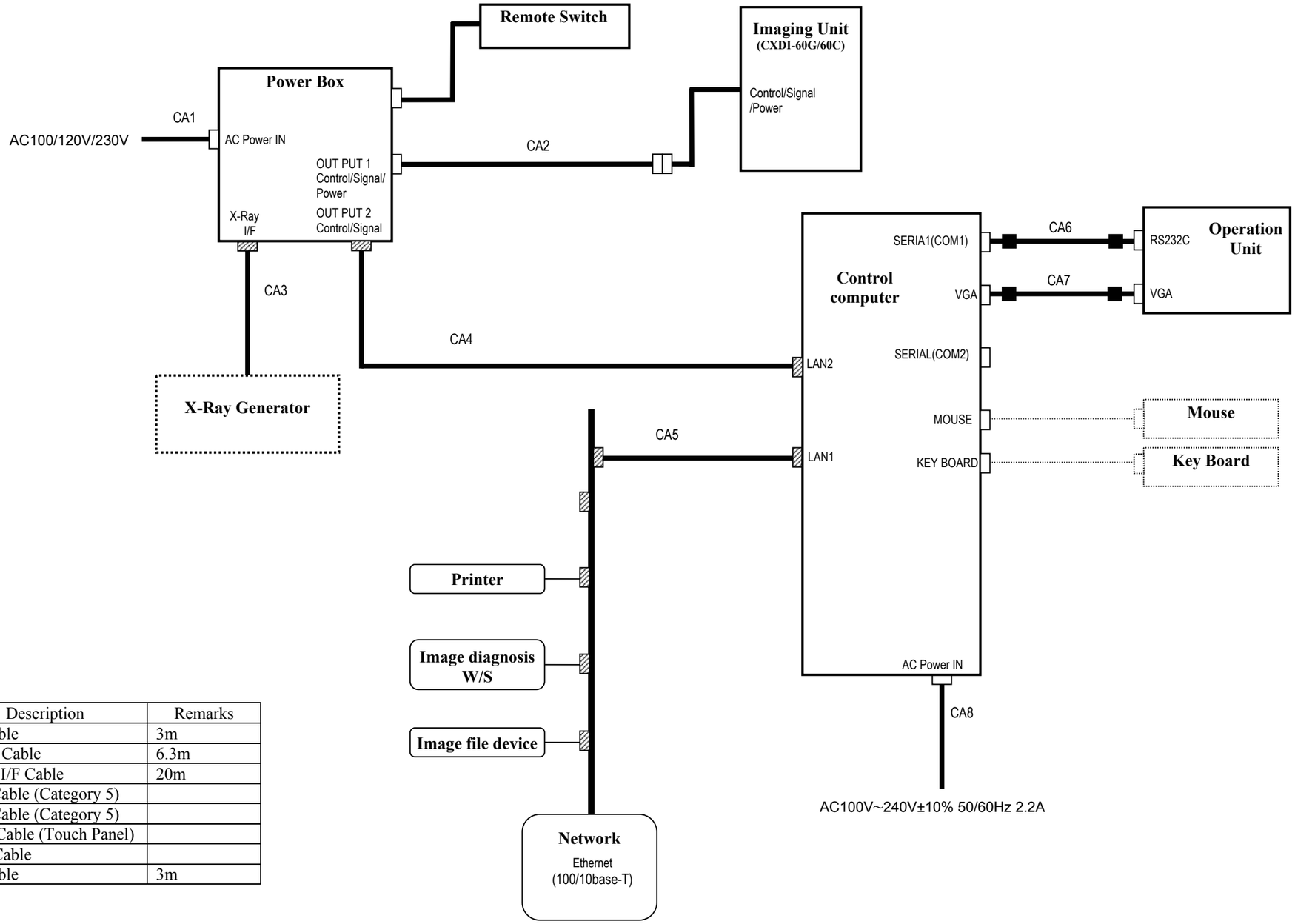
CXDI-60C

CXDI Software	Ver.7.2 and later
Serial number of CXDI-60C imaging unit	100001 and later

Notes on usage

From the view of risk management, guarantee is not made for the waterproofing for blood and chemicals, hygienic safety in operating room, usage with a defibrillation device in ICU, outdoor usage or application to animals. If the imaging unit needs to be used under such condition, the system integrator should be responsible for the operation and understanding of the tolerance of the product specification.

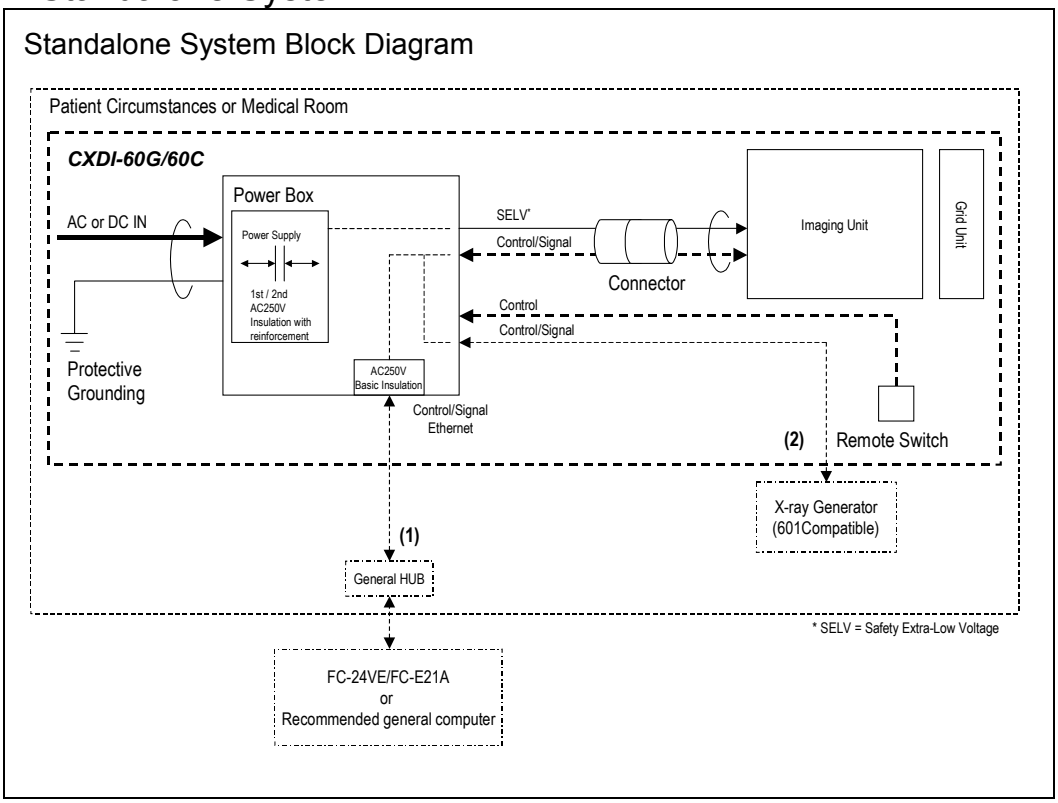
2 CXDI System Block Diagram



Symbol	Description	Remarks
CA1	AC Cable	3m
CA2	Sensor Cable	6.3m
CA3	X-Ray I/F Cable	20m
CA4	LAN Cable (Category 5)	
CA5	LAN Cable (Category 5)	
CA6	Serial Cable (Touch Panel)	
CA7	VGA Cable	
CA8	AC Cable	3m

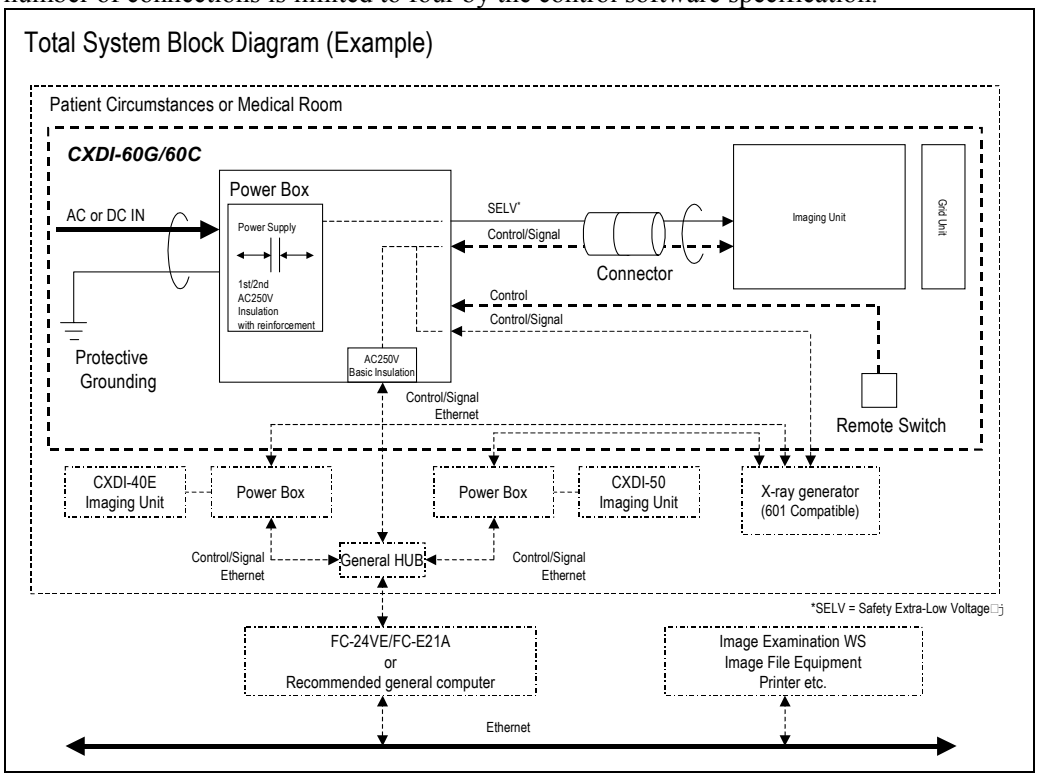
3 System Diagram

3.1 Standalone System



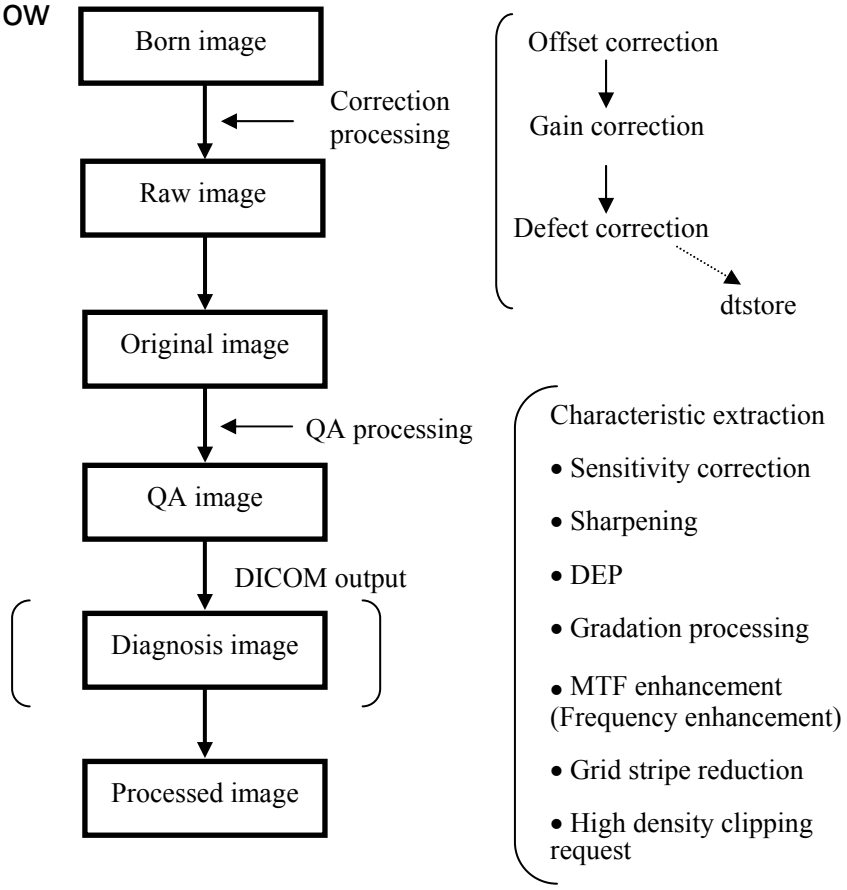
3.2 Total System

It can be connect to (1) and (2) of the system where the existing products have already been connected. Extend the ethernet port by general switching HUB or ethernet card. The maximum number of connections is limited to four by the control software specification.



4 CXDI Image Processing

4.1 Proccess Flow



4.2 Image Types

(1) BORN IMAGE

The image obtained with LANMIT before any correction is made.

Outside distribution of these images is prohibited, including dtstore images.

(2) RAW IMAGE

Born image after offset processing, gain correction.

This is the image with LANMIT specific characteristics corrected.

(3) ORIGINAL IMAGE

Raw image after preprocessing.

(4) QA IMAGE

Original image after gradation processing, sharpening, and other processing.

The CXDI performs image processing up to this point.

(5) DIAGNOSIS IMAGE

QA image after further image processing necessary for diagnosis.

Image processed by the user for diagnostic purposes.

(6) PROCESSED IMAGE

Diagnosis image after post-processing.

Image modified by the user or the default processed image.

5 Specifications

The CXDI-60G/60C (Imaging Unit/Power Box) is the Digital Cassette that has the mobility and can be used on the optional angles.

(1) Imaging Unit

This unit consists of the internal sensor, PWB-60Di, PCB-AD/REF, PWB-60LED and its outer cover. The sensor unit converts the X-ray image to the electrical signal (O/E Conversion) and after performing the A/D conversion, transfers its signal through the Power Box with Ethernet cable to the Control computer.

Item	CXDI-31		CXDI-60G/60C		Remarks
Object	Cassette (built-in)		Cassette (built-in)/Mobile		
Effective filming range	226.00 x 288.00 mm		234.24 x 284.16 mm		
Number of Pixels	2260 x 2280 (About 6,500,000 pixel)		1476 x 1790 (About 2,600,000 pixel)		
Effective Number of Pixels	2256 x 2878		1464 x 1776		
Pixel pitch	100µm x 100µm		160µm x 160µm		
Fluorescent substance	GOS		60G:GOS/60C:CsI		
Output gradations	12bit (4,096 gradations) A/D 14bit				
Transfer method	Metal: Imaging Unit to E/O BOX Optical fiber: E/O BOX to Control computer (Through the Multi Box)		Ethernet: Imaging Unit to Control computer (Through the Power Box)		
Imaging time	~ 1 sec.				
Imaging cycle	15 sec.				
Dimension	324(W) x 327(D) x 20.8(H) mm		344.4 (W) x 380* (D) x 22.5 (H) mm		
Imaging Unit coloring	Art gray		Cool white		
Imaging Unit mass (w/o grid)	2.8Kg (Except the cable) 3.3Kg (Including the cable)		2.5Kg (Except the cable) 2.8Kg (including the cable)		
Space between surface where patient gets in contact (CFRP) and sensor surface (glass)	5.75mm		Within 5.1±0.5mm.		
Heat emission	Average	(43.2kJ/h)	Remote SW OFF	36kJ/h or less	
	Max	162kJ/h	Max load mode	126kJ/h or less 1 image per 15 Sec.	
Power Consumption	Average	(12W)	Remote SW OFF	10W or less	
	Max	45W	Max load mode	35W or less (1 image per 15 Sec.)	
Mechanical strength*	Load uniformly: 1.47kN(150kgf), 1min Load locally: 0.98kN(100kgf), ϕ40mm, 1min The imaging unit is put on the plain surface with the Sensor side (Detector) is up.				Self-imposed rule For CXDI-31, local strength applies to the center of the sensor.
Control computer	-CXDI-C2 -CXDI-C3		-FC-24VE/FC-E21A for CXDI Control Station -General computer with a performance equal to FC-24VE/FC-E21A -CXDI-C3/C3S		Ethernet card is necessary to connect CXDI-60G/60C with CXDI-C3
Power Control (ON/OFF)	Interface with a Control computer		None (Power Box: Operation with Remote switch manually)		
Grid attach/remove detector	Yes				

1. General

Item	CXDI-31	CXDI-60G/60C	Remarks
Sensor cable	From imaging unit to E/O Box: 4.5m	Sensor cable (imaging unit side): 1.5m Sensor cable (power box side): 6.3m	
Count of connected sensor	Up to four imaging units are connectable to a single control computer via multi box. For the same type of imaging unit, the maximum of connection number will be three.	Up to four Imaging Units are connectable to a single control computer via Network switch. For the same type of imaging unit, the maximum of connection number will be three. Each imaging unit requires a power box.	Network switch should be procured at each sales company.
Scattered radiation backward block sheet Environment-conscious unleaded type	Lead cover	Mo sheet (0.3 mm thick)	
Photo timer	Cannot be built in		
Imaging restriction (Imaging Prohibition)	When the internal temperature of Imaging Unit is above 45 degree Celsius, its state is changed to sleep mode. And the Imaging prohibition will be continued when the internal temperature is below 44 degree Celsius.	When the internal temperature of Imaging Unit is above 49 degree Celsius, its state is changed to sleep mode. And the Imaging prohibition will be continued when the internal temperature is below 48 degree Celsius.	

User interface	Indication		Indication	Busy	Sensor	Power	
	Color	Two colors	Color	Orange *1	Green	Blue	
	Imaging unit is off	Off	Imaging unit is off	Off	Off	Off	
	Imaging unit is on	Orange light will turn on	Imaging unit is on	--	Off	On	
	Preparing imaging	Green light will flash*1	Preparing imaging	--	Blinking *2	On	
	Imaging preparation complete	Green light will turn on	Imaging preparation complete	--	On	On	
	Error status	Green light will flash*2	Error status	--	Blinking *3	On	
			Communi-cating	On	--	On	
			Initialization (when startup)	--	Blinking *4	On	
			Network not set (when startup)	--	Blinking *5	On	
	*1: Turns on and off for 0.5 seconds each *2: Turns on and off twice for 0.5 seconds, then turns off for 0.5 seconds		*1: Green for China *2: Turns on and off for 0.5 seconds each *3: Turns on and off twice for 0.5 seconds, then turns off for 0.5 seconds *4: Fades in for 1 second and fades out for 1 second *5: Fades in for 2 seconds, and then turns off				

(2) Power Box

This unit consists of PWB-60X-RAY, 60 Sensor Power Supply and its outer cover.

The function; the signal transition between Imaging unit and Control computer, the interface to the X-ray generator equipment and power supply to the Imaging unit has been implemented.

Item	Content	Remarks
Communication method with Control computer	IEEEE* 802.3u (100BASE-TX) *	Connector type: RJ45
Communication method with PWB-60XRAY	Asynchronous serial communication method	Data length: 10bit Data rate: 15.625 kHz
Power supply	AC 100-240V 50/60Hz 1.2-0.7A	Reference 60 Sensor Power supply Rated Voltage: AC 100-240V (AC 85-264V)
Mass	3.7 Kg	Except the external cables
Dimension	358(W) x 200(D) x 65(H)* mm	Except bottom rubber parts (With bottom rubber parts: 75mm)

(3) Environment rated parameters

Item		Content	Remarks
Operating environment	Ambient temperature	+5 to +35°C	Must be without dewing
	Relative humidity	30 to 75% RH	
	Atmospheric pressure	700 to 1060 hPa	
Storing or transporting environment	Ambient temperature	-30 to 50°C	Must be without dewing
	Relative humidity	10 to 60% RH	
	Atmospheric pressure	700 to 1060hPa	

* IEEE: Institute of Electrical and Electronic Engineers

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CXDI-60G/60C

2. Installation Manual

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1 Caution During the Installation

Please pay attention to the followings when installing the system.

(1) If the equipment is hoisted, lowered or transported, it must be supported at both sides by a minimum of two people so there is no danger of it falling.

(2) When installing the equipment, be sure the site meets the following criteria:

1) There must be no dripping water in the area.

2) The environment must be free of harmful elements such as humid or acidic air, air with a saline or sulfur content, where there is poor ventilation or where air pressure or temperature is unusual.

3) The equipment must not be placed at an angle or subjected to vibration or shock (this includes during transportation).

4) The equipment must not be kept where chemical products are stored or where gasses are generated.

5) The site's power supply must be of the correct voltage and frequency for the equipment.

6) The site must be connected to a fully earthed cable with sufficient ground resistance to meet standard values.

(3) After installation, be sure to dispose of waste product packaging with care and with full respect for the environment.

2 Restrictions on Installation

(1) A clearance of at least 150mm must be left between a imaging unit and power box.

(2) It is forbidden to use the cables (Sensor cable, X-ray interface cable, etc.) from the power box for moving parts. The only exception to this restriction is the sensor cable that is to be connected to the imaging unit.

3 Caution on Installation

(1) Do not install the imaging unit near electronic devices as noises and artifacts tend to appear on images in the electromagnetic field.

e.g. CRT monitor, X-ray generator, and any other medical electronic devices.

(2) Follow the following steps to detach the sensor cable while the system is running.

1) To detach the sensor cable

- Check the LED of the imaging unit and the display of the control computer to make sure the status of communication between the imaging unit and control computer is idle. (*1)

- Turn off the main power switch of the power box or the remote switch. (*2)

- Make sure the LED on the imaging unit, switch on the power box and remote switch are turned off. Power supply to the Imaging unit must be disconnected.

- Detach the connector of the sensor cable.

*1: Do not detach the sensor cable during the data transmission between the imaging unit and control computer, it may cause data loss, system error or equipment breakdown.

*2: Do not detach the sensor cable when the power is being supplied from the power box, it may cause equipment breakdown. If you disconnect the imaging unit by improper steps, the “Error” LED on the power box and remote switch will be turned on to alert you the sensor cable is detached improperly. To restore from the error, turn off the main switch of the power box or the remote switch. Then connect the sensor cable again by following the steps described in the next column.

2) To attach the sensor cable

- Make sure the LED on the imaging unit, switch on the power box and remote switch are turned off. Power supply to the Imaging unit must be disconnected.

- Connect the connector of the sensor cable.

- Turn on both the main switch of the power box and remote switch.

(3) Before proceeding with installation, ensure that the static accumulated in the bodies of the installation personnel is discharged. Similarly, before touching the PCBs (when removing them) or cable connectors, ensure that all static is discharged.

(4) With the launch of CXDI-60C, the specification of the CXDI-60G sensor cable is changed to conform to CXDI-60C. For details, refer to “7.1.4 Interchanging a Imaging Unit”.

4 Product Configuration

4.1 Product Configuration List

1) CXDI-60G/60C

No.	Item Name	Qty	Remarks
1	CXDI-60G/60C Imaging Unit	1	with 1.5 m sensor cable S150-60 (imaging unit side)
2	Sensor cable P630 (power box side)	1	6.3m
3	Operation manual (for imaging unit)		
4	Attached documents for medical		(JPN)
5	Warranty registration		(JPN)
6	Warranty card		(US)
7	German Security leaflet/WEEE leaflet		(EU)

2) CXDI SYSTEM II

No.	Item Name	Qty	Remarks
1	Power Box	1	
2	X-ray I/F cable	1	20m
3	Remote switch	1	20m
4	Power supply cable (with AC plug)	1	3m (100/120/230V)
5	Operation manual (for power box)		

3) Sensor Cable (Optional)

No.	Item Name	Qty	Remarks
1	Sensor Cable P630-PM (Panel mount type)	1	6.3m
2	Sensor Cable P70-60 (imaging unit side)	1	0.7m
3	Sensor Cable SP780-60 (Straight type)	1	7.8 m

LAN cable for connecting Control Computer / Power Box and Network switch (Switching HUB) for connecting the multiple Imaging Units shall be procured at each sales company.

- LAN cable (Over category 5)
  Recommended length of the cable is 30m or less.
  When Control Computer and Power Box are connected directly, Cross type is used, but when they are connected via Network switch, Straight type is used. However, this is not applied when Network switch has AUTO-MDI/MDI-X function*.

- Network switch (Switching HUB)
  Sales companies adopt Network switch (Switching HUB) after conducting the test and the operation check for Switching HUB that meets the general standard.

4.2 Configuration

No.	1	No.	2
Name	CXDI-60G/60C Imaging Unit	Name	Sensor cable P630 (Power box side)
Qty	1	Qty	1
Remarks	Sensor cable S150-60 (imaging unit side)	Remarks	6.3m
No.	3	No.	4
Name	Power Box	Name	X-ray I/F cable
Qty	1	Qty	1
Remarks	I/F and Power supply	Remarks	Connection with X-ray generator
No.	5	No.	6
Name	Remote switch	Name	Power supply cable
Qty	1	Qty	1
Remarks	Switch to turn on and off Power Box	Remarks	For Power Box (100/120/230V each type)

4.3 Sensor Cable (Optional)

No.	1	No.	2
Name	Sensor Cable P630-PM (Panel mount type)	Name	Sensor cable S70-60 (Imaging unit side)
Qty	1	Qty	1
Remarks	6.3m Detachable cable connector	Remarks	0.7m Detachable cable connector Connector form: New type (External diameter φ18)
No.	3		
Name	Sensor Cable SP780-60 (Straight type)		
Qty	1		
Remarks	7.8 m Non-detachable cable		

Sensor cable P630-PM (panel mount type)

This sensor cable can be used in place of a standard sensor cable P630 (power box side). Only the difference between them is the form of the connector. There is no difference in the function of the cables.

Sensor cable S70-60 (imaging unit side)

This sensor cable can be used in place of a standard sensor cable S150-60 (imaging unit side). Only the difference between them is the length of the cable. The sensor cable S70-60 is 0.7m in length. There is no difference in the function of the cables.

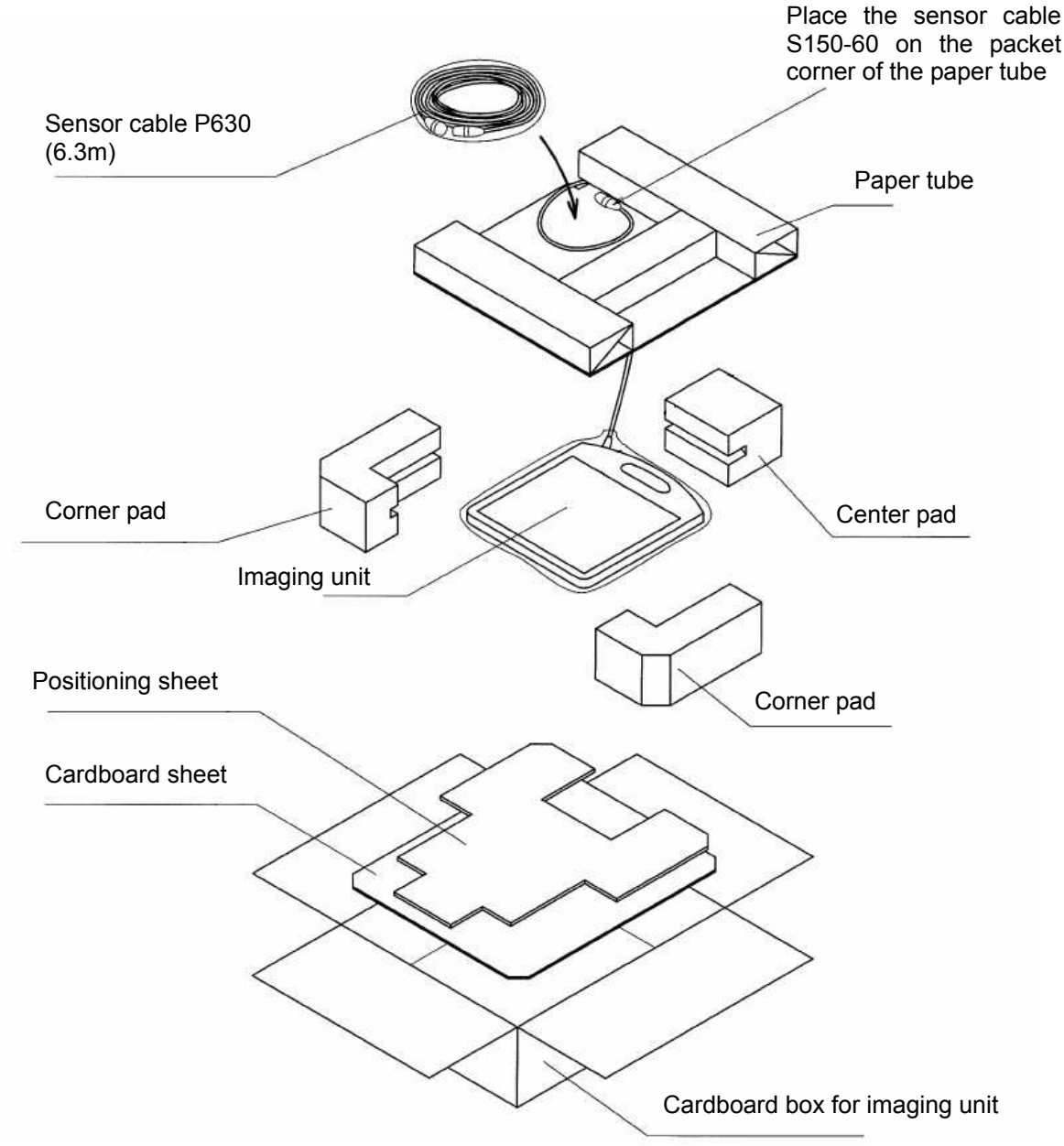
Sensor cable SP780-60 (straight type)

This is a single straight type sensor cable with no detachable connectors. This single cable can be used in place of a standard sensor cable S150-60 (imaging unit side) and a standard sensor cable P630 (power box side). There is no difference in the function of the cables.

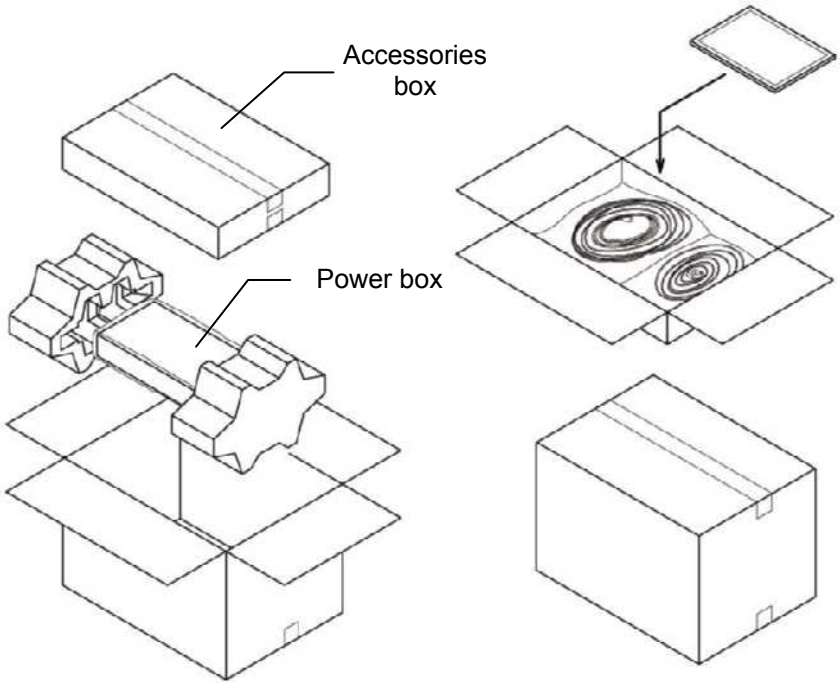
5 Packing Diagram

5.1 X-ray Digital Radiography System (CXDI-60G/60C)

(1) CXDI-60G/60C Imaging Unit Package

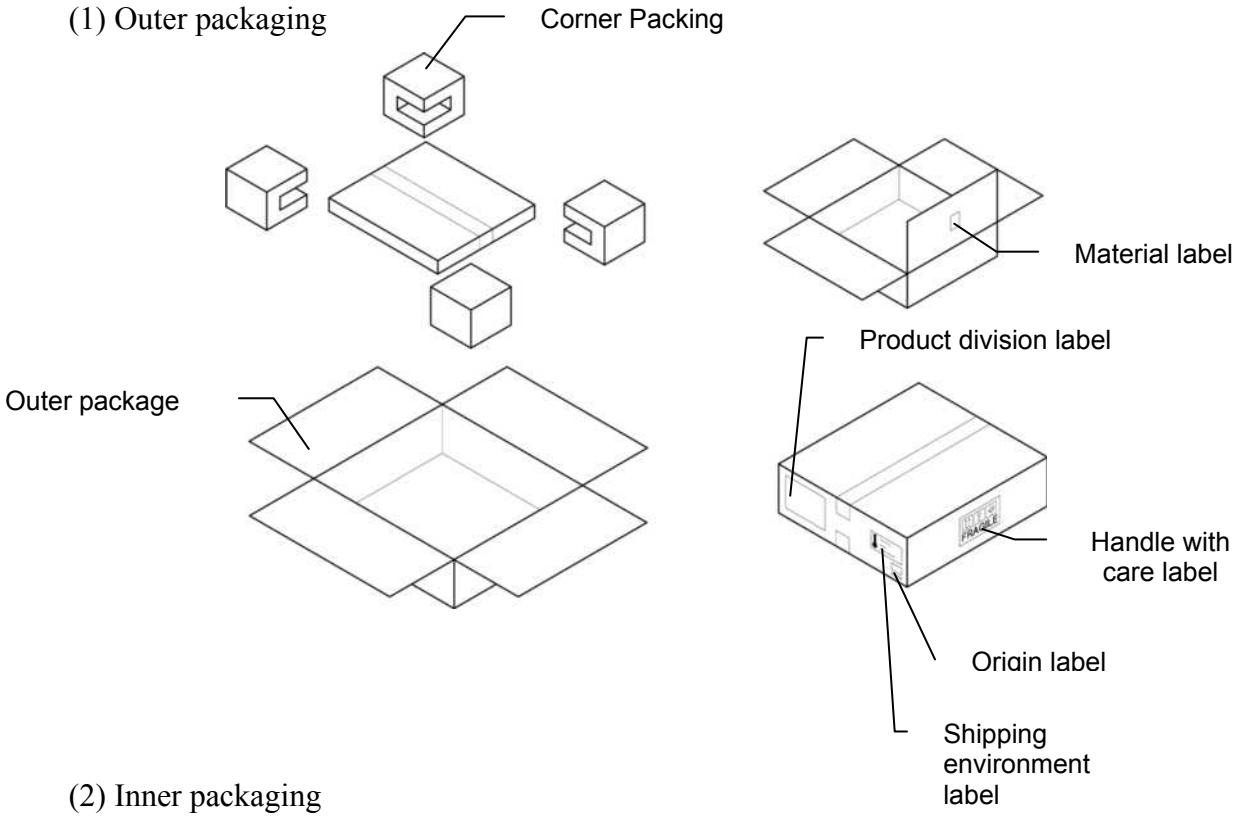


(2) CXDI System II assembly package

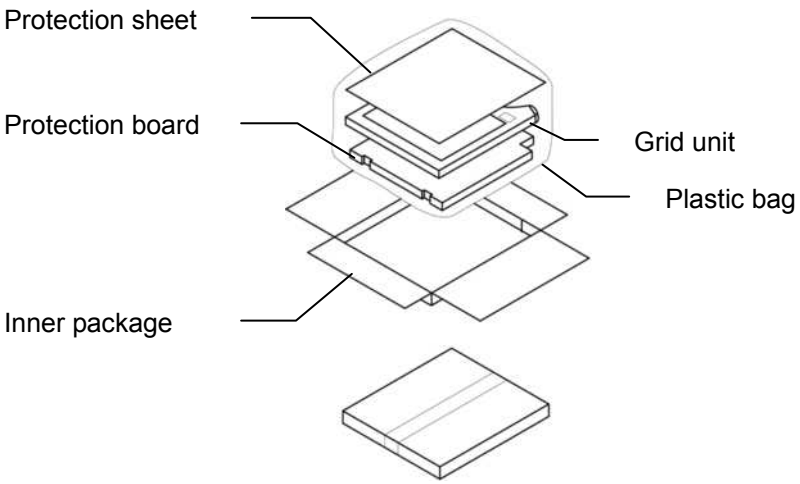


5.2 Grid (Optional)

(1) Outer packaging



(2) Inner packaging



6 Installation Procedures

6.1 Lists of Tools Needed for Installation

No.	Tool Name	Unit	Remarks
1.	General Tools	1 set	JIS Screwdriver Set
2.	Laptop computer	1	PC/AT compatible (OS: Microsoft Windows XP Professional recommend)
3.	LAN Card	1	For Laptop computer (as required)
4.	Mouse	1	PS/2 type
5.	Keyboard	1	PS/2 type
6.	HUB	1	Connection between Control Computer and Laptop Computer
7.	10/100BASE-TX cable	2	Straight type (Control PC to Laptop computer)
8.	CXDI Software version compatibility table	-	
9.	Mirror, oil-based marker and paper etc.	1	For adjusting the alignment with the X-ray tube.

6.2 System Installation Procedures

No.	Step	Conditions and Checkpoints	Reference Section
1	Unpacking and checking the product's constituent parts	-There must be no missing parts, damage, dents, etc. -There must no color changes in the shock sensor.	
2	Connect the Imaging Unit and the Power Box	-Handle the instrument carefully, as it may be damaged if something is hit against it, dropped or receives the strong jolt. -The cable must be routed in such a way that no unreasonable loads are brought to bear upon them.	
3	Connect the Power Box and the Control PC	-The cable must be routed in such a way that no unreasonable loads are brought to bear upon them.	
4	Connect the Power Box and the X-ray generators	-The manufacturer of the X-ray generators must be asked to handle the connections with the generators.	
5	Check date and time	- Date and time must be changed according to the area where the instrument is installed.	"(1) Checking and Setting the Date and Time" in section 7.6.
6	Check the software program's version	-The compatibility of the imaging unit and the Control PC must be checked on the compatibility list, and the software program must be installed or upgrade as required.	"(2) Checking the Firmware Version" in section 7.6.
7	Identifying the Imaging Unit (input the sensor serial numbers)		"(6) Identifying the Imaging Units" in section 7.6.
8	Enter control computer serial number.		"(7) Entering Control Computer Serial Number" in section 7.6.
(9)	Adjusting the timing with X-ray generator	-No required usually.	
10	Calibration	-No error must be displayed.	Operation Manual
11	Setting the Fixed ROI Areas	If necessary, set the ROI area.	
12	Set exposure parameter table	-Set it in consultation with the technician.	"(8) Table Setup Setting" in section 7.6.
13	Set annotation	-Set it in consultation with the technician.	"(9) Performing the Annotation Setting" in section 7.6.
14	Connect the network and set the output destination		"(10) Network Connections" in section 7.6.
15	Startup settings		"(5) Set Up Startup Menu" in section 7.6.
16	Exposure testing	-The data must be sent to the printer and storage and the image quality must be checked.	Section 5.7 Image Quality.
17	Check the linearity of the transferred image density.		"(11) Linearity Check Image Density" in section 7.6.
18	Operation unit Gamma correction		"(12) Operation Unit Gamma Correction" in section 7.6.
19	Body parts settings	-The engineer in charge must be consulted prior to perform these settings.	Operation Manual
20	Check and set the system settings.	-The engineer in charge must be consulted prior to perform these settings.	Each section in section 7.6. Settings.
21	Total adjustments and delete the unnecessary data.	-Conform according to the check sheet. -Delete the unnecessary data.	Section 7.9 Post-installation check.
22	Cleaning		

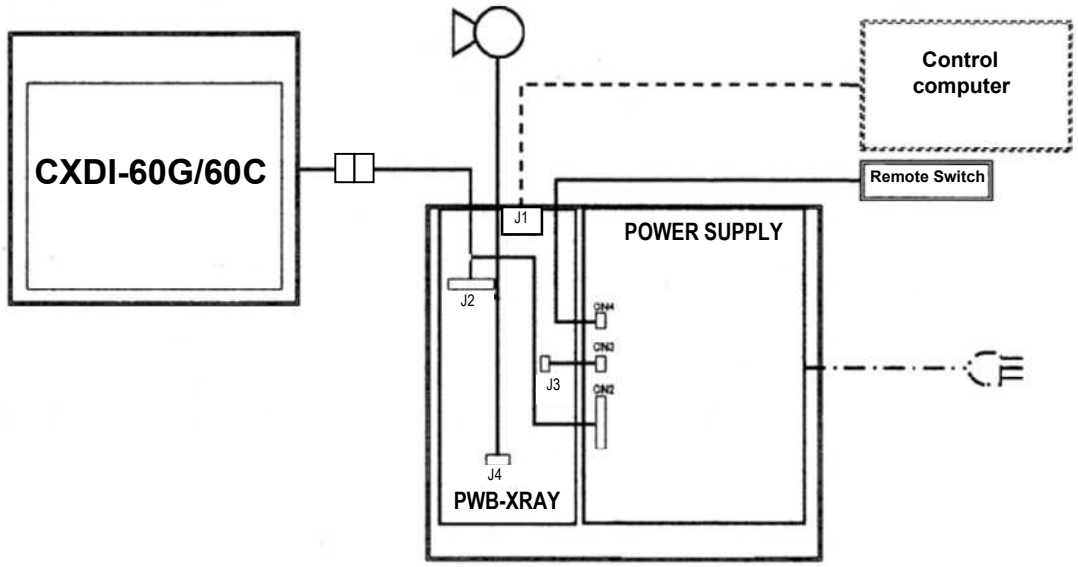
2. Installation

No.	Step	Conditions and Checkpoints	Reference Section
23	Explain the operation to the user		Operation Manual
24	Final parameter adjustment	-The engineer in charge must be consulted prior narrowing down the adjustments to the final values.	Operation Manual
25	Inserting the backup floppy disk.	-It must be confirmed at re-start that backup files have been made. -No necessary for the system installed in vehicles.	"(15) Backing up Setting Data to FD" in section 7.6.
26	Back up valuable data	-Copy the CCR folder to the removal drive.	"(14) Backing Up when Installing" in section 7.6.

7 Installation

7.1 Connection to Each Unit

7.1.1 Connection Diagram



POWER BOX

7.1.2 Connecting to the Power Box

(1) Removing the cover

1) Remove the 5 screws from the back of the power box and the 2 screws on each side at the bottom of the power box to remove the top cover.

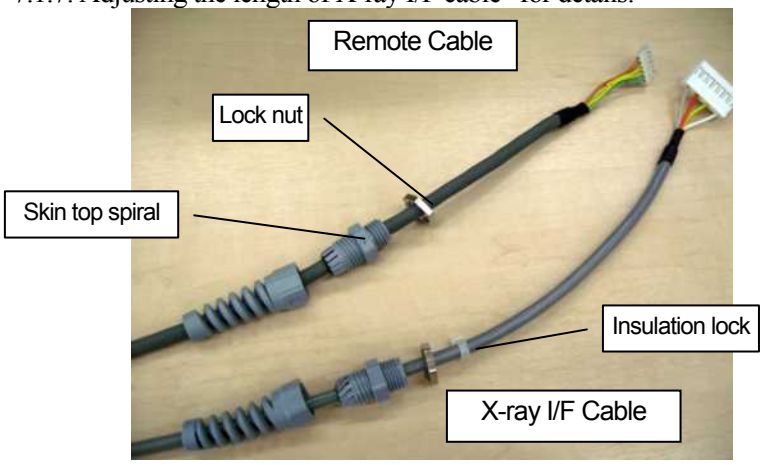
Different types of screw are used for backside and lateral side. Make sure to use the proper type of screw respectively on installation.

2) Before connecting the X-ray I/F cable and remote cable, remove the LAN cable connector guard to avoid injury.

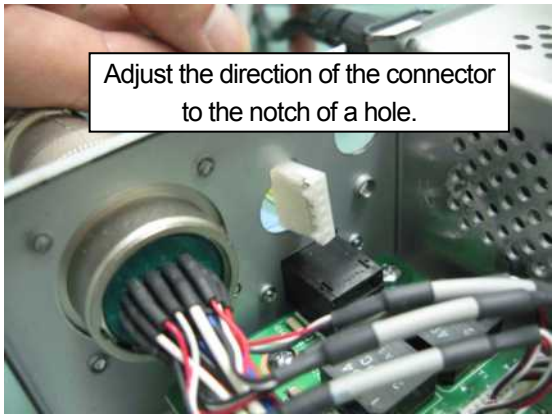
(2) Cable connections

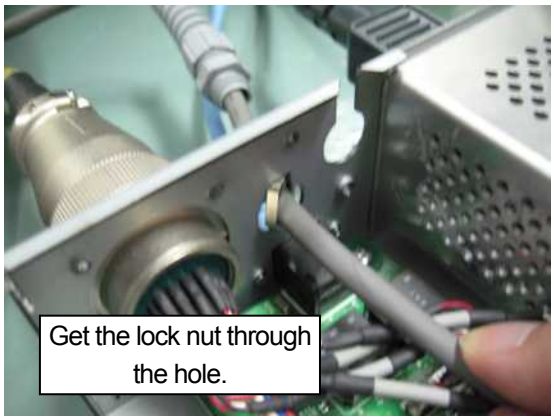
1) Loosen the skin top spiral and lock nut of the remote cable and X-ray I/F cable. Do not remove the insulation lock from the X-ray I/F cable as it is put on the cable to prevent the cable from falling off.

*The X-ray I/F cable is 20m in length. If the cable is too long, you may need to make it shorter. Refer to "7.1.7. Adjusting the length of X-ray I/F cable" for details.

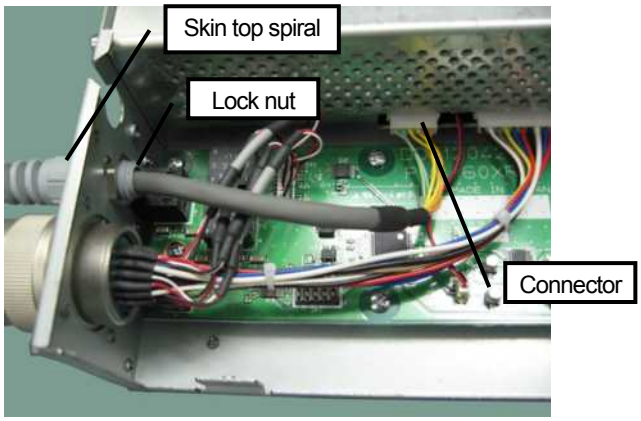


2) Get the connector and lock nut of the remote cable through the hole in a power box.

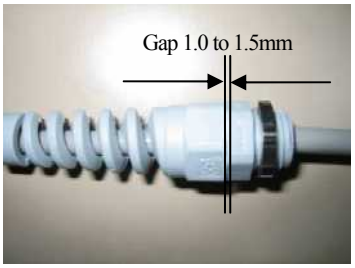




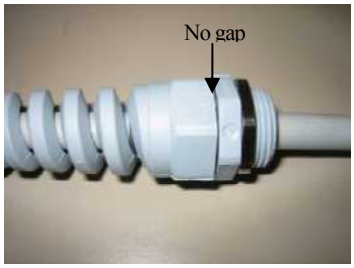
3) Connect the connector of the remote cable to the power supply and joint the skin top spiral and lock nut temporarily. Adjust the length of the cable with some margin in length for wiring. After adjusting the length properly, fasten the skin top spiral tightly.



Note: To avoid the risk of damage when the cables are removed with very large force, check skin top spiral of the bush (refer the following figure).



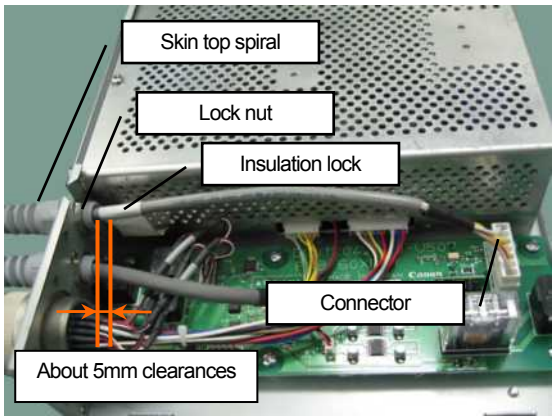
<Remote cable>



<X-RAY I/F cable>

4) Fasten the skin top spiral and lock nut tightly using 15mm screw wrench.

5) Connect the connector of X-RAY I/F cable to the power supply and joint the skin top spiral and lock nut temporarily. Adjust the length of the cable so that the clearance of the skin top spiral and insulation lock is 5mm. After adjusting the length, fasten the skin top spiral tightly. Refer to the note in step 3.



6) Tighten the skin top spiral and lock nut using 15mm screw wrench.

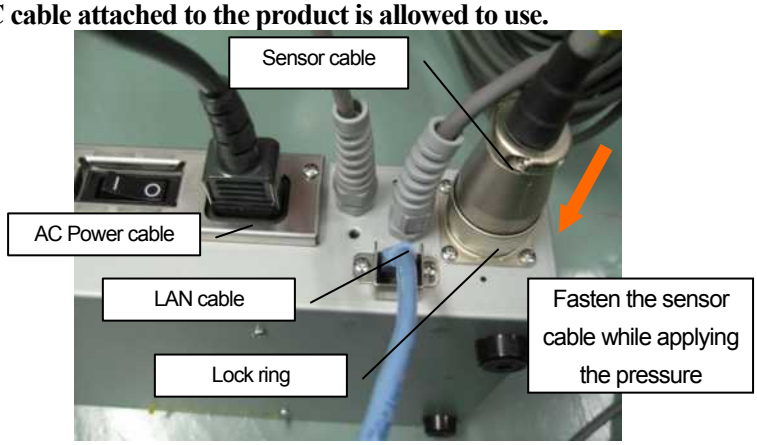
7) After connecting the cables, attach the cover of power box and LAN cable connector guard.

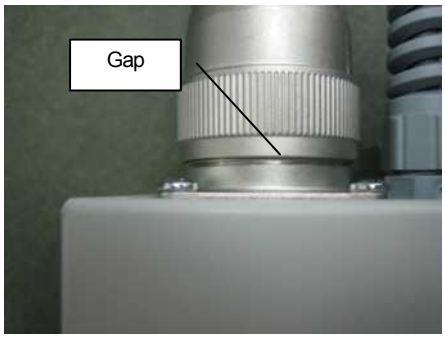
***Different types of screw are used for backside and lateral side. Make sure to use proper type of screw respectively on installation.**

8) Connect the sensor cable, LAN cable, AC cable to the backside of the power box.

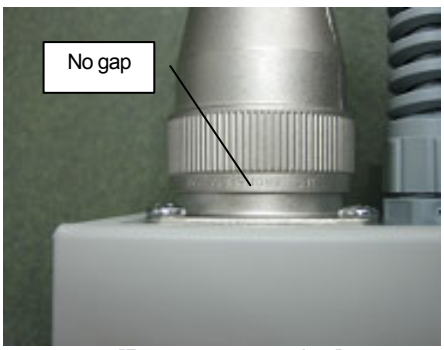
***1 Push the connector of the sensor cable into the connector terminal and fasten it tightly until the lock ring stops.**

***2 Only the AC cable attached to the product is allowed to use.**





[Improper connection]

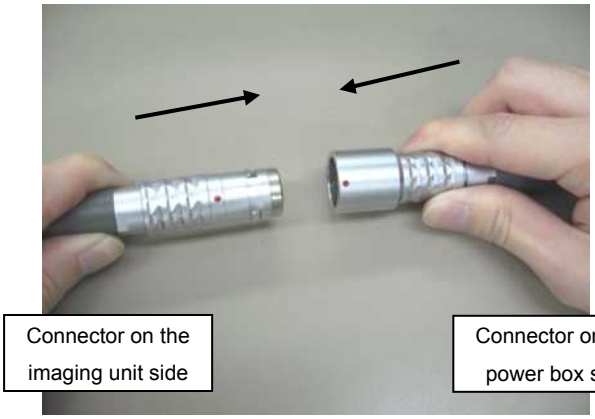


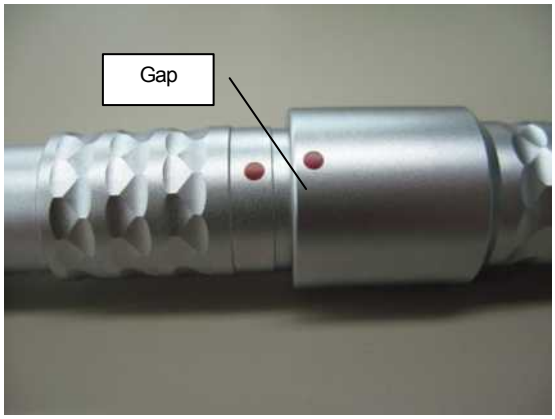
[Proper connection]

9) Align the red marks on the connector of the sensor cable on both sides and joint the connectors together until it locks. It snaps when it locks.

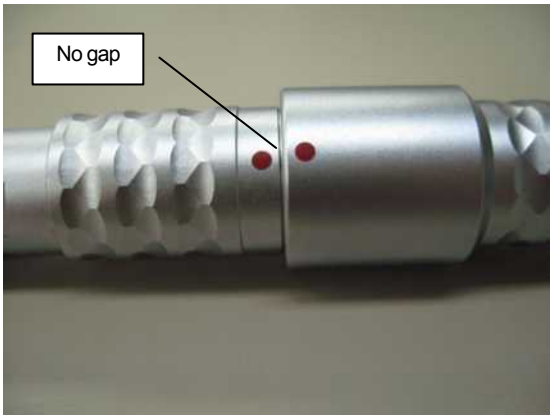
***1 Turn off the power of the power box before connecting or disconnecting the sensor cable.**

***2 Be careful not to drop the connector of the cable, it may cause injury or get the things damaged as it is heavy.**





[Improper connection]

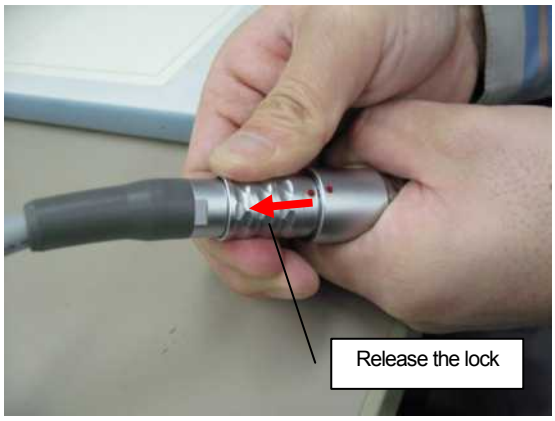


[Proper connection]

10) To disconnect the sensor cable, push the connector of the imaging unit side cable outward to release the lock and pull out the connector of the imaging unit side straightforward. Do not grab the cable itself.

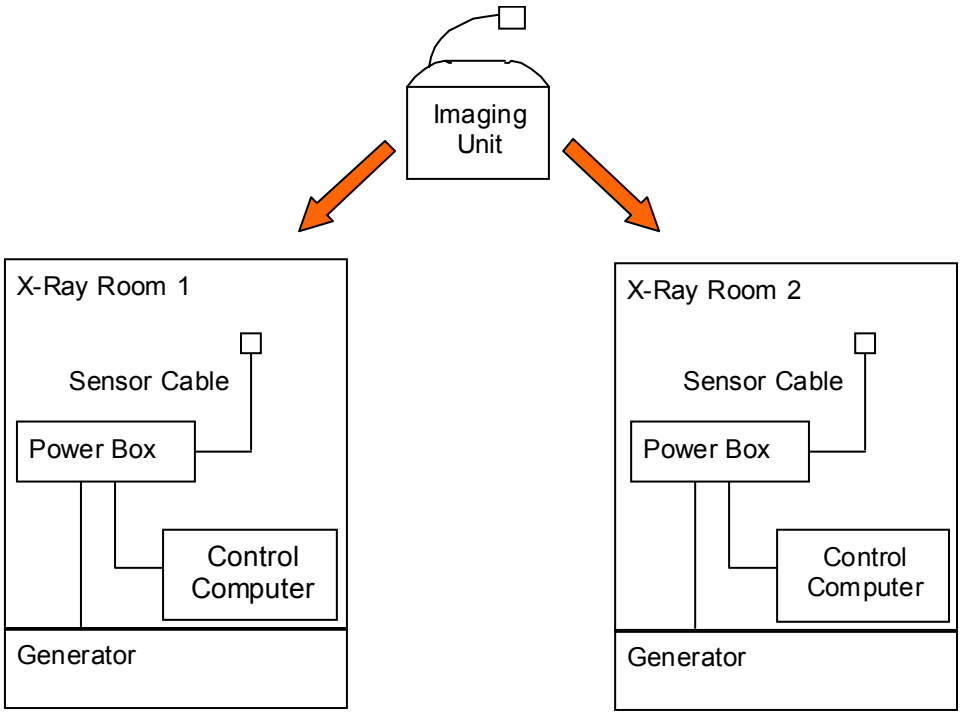
***1 Turn off the power of the power box before connecting or disconnecting the sensor cable.**

***2 Be careful not to drop the connector of the cable, it may cause injury or get the things damaged as it is heavy.**



7.1.3 Using the Imaging Unit in the Multiple Rooms

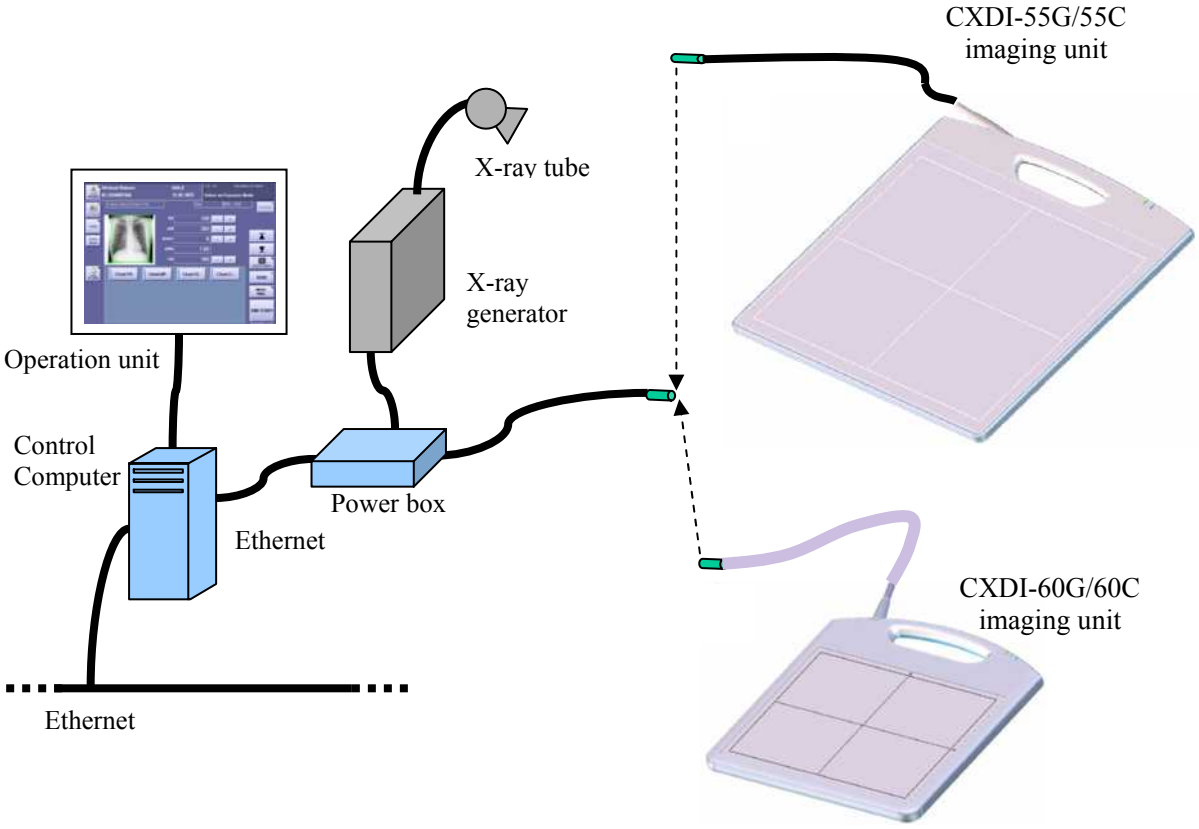
Users can use one imaging unit in the multiple rooms with the CXDI SYSTEM II installed by the service engineer. The steps to connect and disconnect the detachable connector of the sensor cable are described in the operation manual.



7.1.4 Interchanging a Imaging Unit

The detachable connector enables you to replace the imaging unit with the CXDI-55G/55C imaging unit. As for the CXDI-60G having the old type sensor cable, plug and socket of the connector does not match. Therefore, you need to replace it with the new type sensor cable.

With the launch of CXDI-60C, the new type sensor cable, which is conform to CXDI-60C, has been adopted to CXDI-60G.



- Detachable connector of the CXDI-55G/55C sensor cable

CXDI-55G/55C
Imaging Unit

Power Box

- Detachable connector of the CXDI-60G sensor cable (New type) and the CXDI-60C sensor cable

CXDI-60G/60C
Imaging Unit

Power Box

- Detachable connector of the old type sensor cable on the CXDI-60G imaging unit side
  For the CXDI-60G imaging unit having the old type sensor cable, plug and socket of the connector does not match. Refer to the Service Manual report CXDI-60G 09-002 for details.

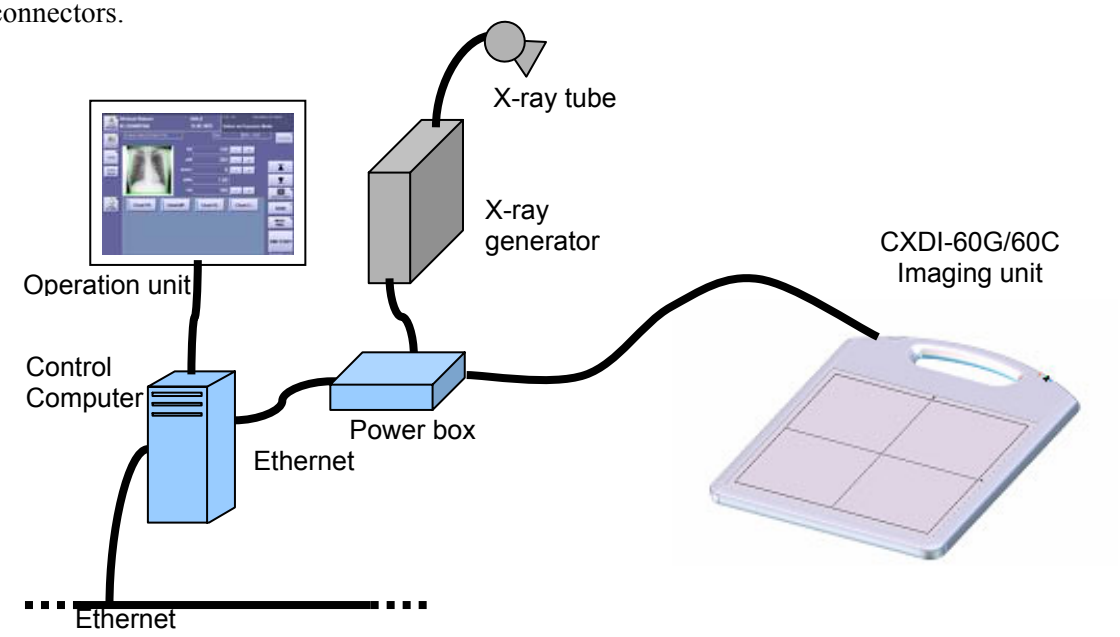
CXDI-60G
Imaging Unit
(Old type sensor cable)

Power Box

7.1.5 Sensor Cable (Optional)

(1) Sensor cable S70-60 (imaging unit side)
You can replace the sensor cable on the imaging unit side with the shorter type of 0.7meters long sensor cable.

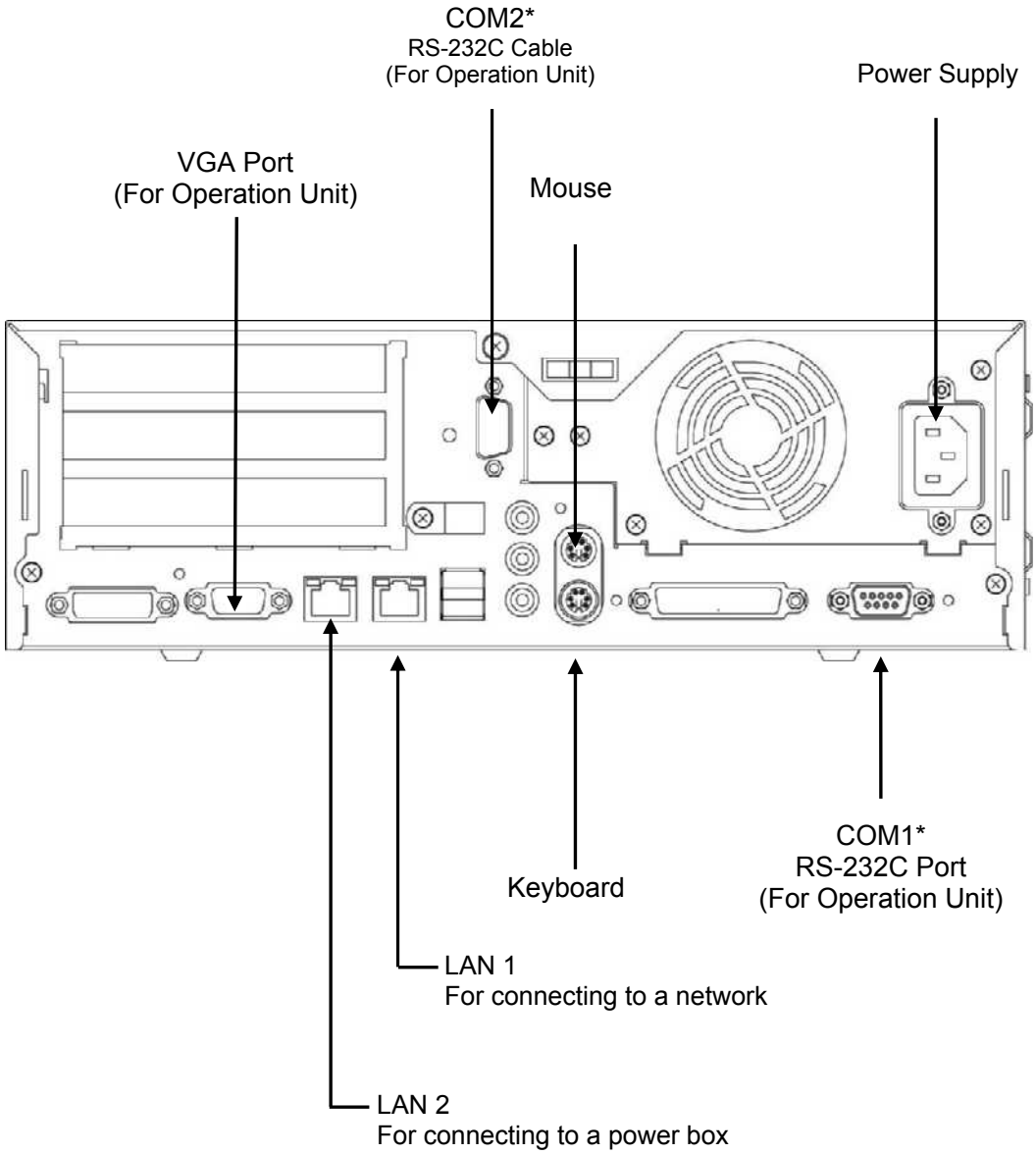
(2) Sensor cable SP780-60 (Straight type)
The sensor cable can be replaced with the straight type sensor cable with no detachable connectors.



(3) Sensor cable P630-PM (Panel mount type)
This sensor cable can be used in place of a standard sensor cable P630 (power box side). The connector of the sensor cable P630-PM(panel mount type) can be tightened to a stand or a table. Note that an insertion hole of 24.1mm in diameter is necessary for a stand or a table to fasten the connector.

7.1.6 Connection Diagram for Control Computer Rear Panel

FC-E21A



*Connect the RS-232C cable to the COM port, COM 1 or COM2, specified as the port in the driver for Operation Unit.

7.1.7 Adjusting the Length of X-ray I/F Cable

X-ray I/F cable is 20m in length. It may be too long for some installation sites and you may need to make it short. Using the following parts is necessary and the output and input condition should be satisfied.

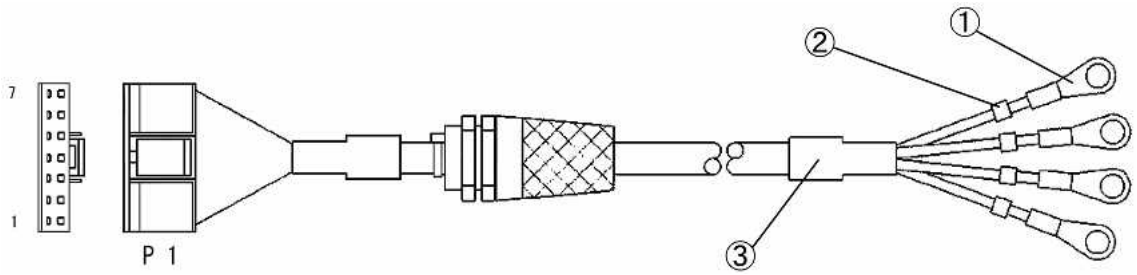
Output
Relay: Voltage AC250V max/DC30V max, Current 10mA to 2A
Retardation
Retardation time: 20msec or less

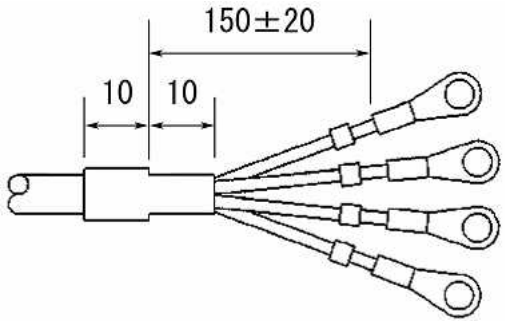
Input
Electrical specification
Photo coupler: Current loop with the resistance 100 Ω or less
Retardation
Retardation time: 1msec or less

Parts

Key No.	Part number	Description	Remark
1	Y67-2868-000	Splice terminal	V0.5-4 Clear/ JST Tool number: YNT-2622 / JST
2	Y67-2869-000	Wire Marker (Mark A)	VS-2 / HAGITEC
	Y67-2870-000	Wire Marker (Mark B)	
	Y67-2871-000	Wire Marker (Mark 1)	
	Y67-2872-000	Wire Marker (Mark 2)	
3	KE2-2101-000	Insulation Tube, L=1 METER	F2 (Z) 6X0.25 (SUMITOMO)

Use the specified tool (YNT-2622/JST) to press the splice terminal. For details, refer to the instruction manual for splice terminal tool.





7.2 Starting up and Shutting Down the System

Perform the following sequences when starting up and shutting down the system.

7.2.1 Sequence for Starting up the System

Perform the following sequence when turning the system power on.

If you do not perform the correct sequence, the imaging unit cannot be recognized, resulting in an error. (This is because the system communicates with the imaging unit when turning the system on.)

The power box cannot be turned on in conjunction with turning on the control computer.

Since the power box is equipped with a remote switch that turns on/off the secondary output, you can install the switch on your side to turn it on/off.

1) Turn on the main power of the power box.
2) Turn on the remote switch of the power box.
3) Turn on the control computer.

   Note:

   Ccrstart.bat should be registered in Windows Startup.

7.2.2 Sequence for Turning the Power off (Shutdown)

1) From OPU, select SYSTEM → [SHUTDOWN] or [SHUTDOWN after transfer]

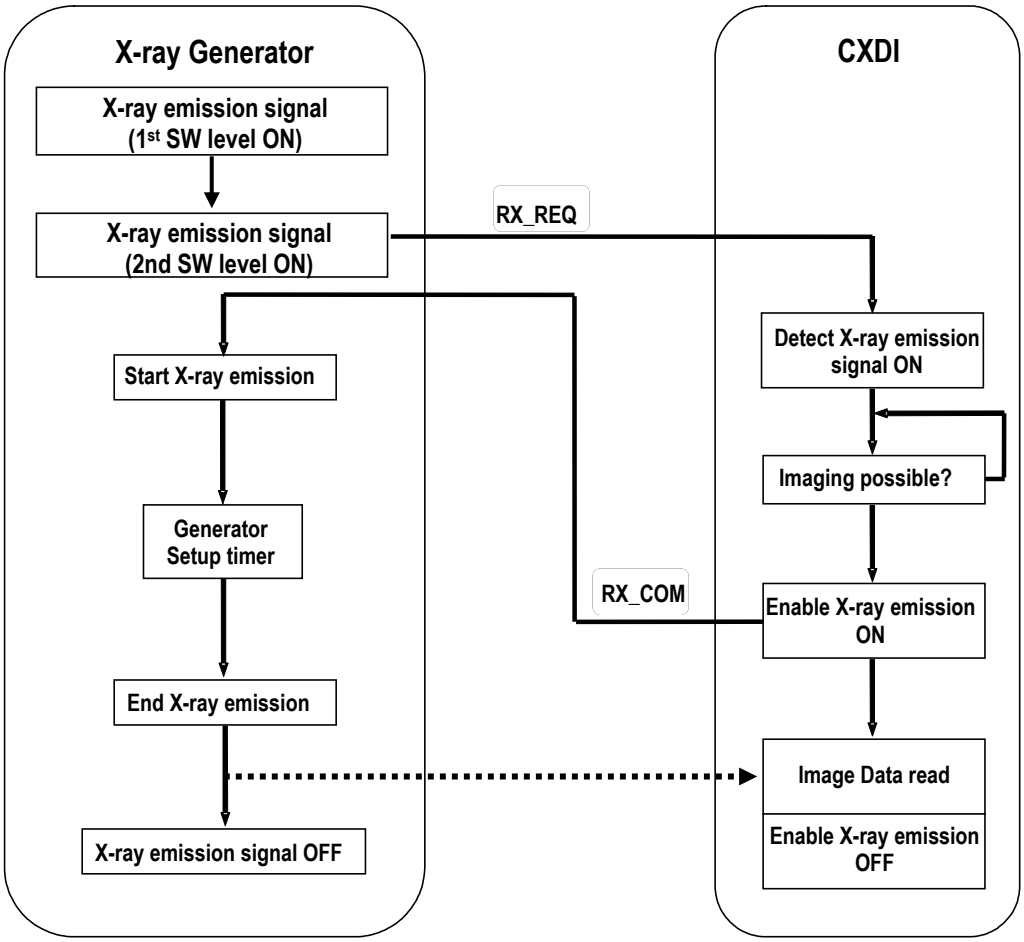
   The control computer automatically turns off.
2) Turn off the remote switch of the power box.
3) Turn off the main power of the power box.

   Note:

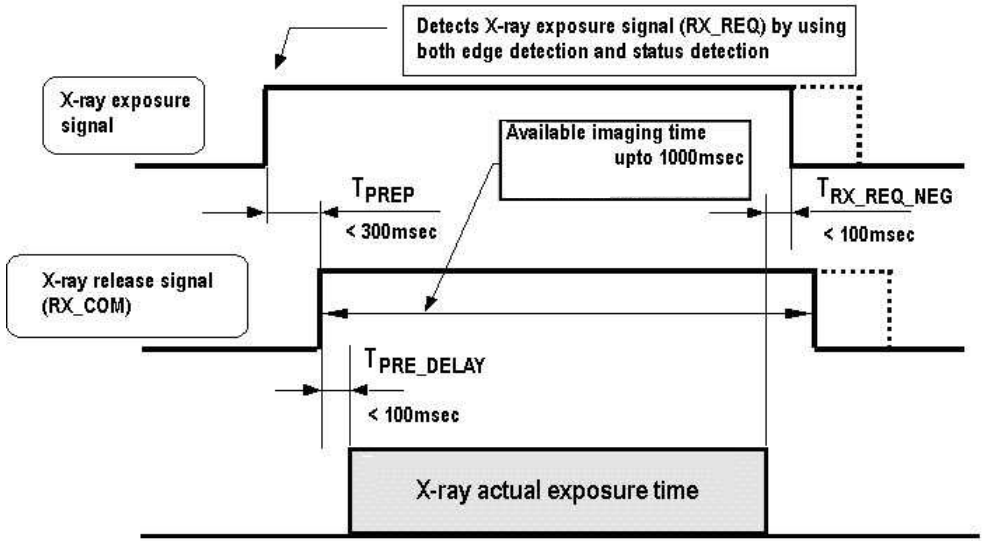
   Turn off the main power of the power box and OPU power when not using the system for a long period.

7.3 X-ray Controller Interface

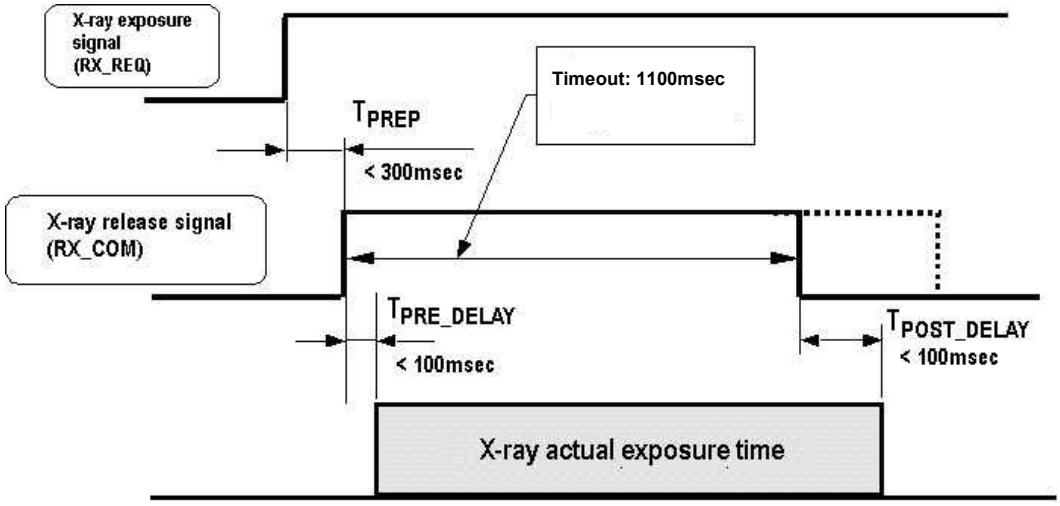
7.3.1 Interface Signal Description



- **During normal imaging**



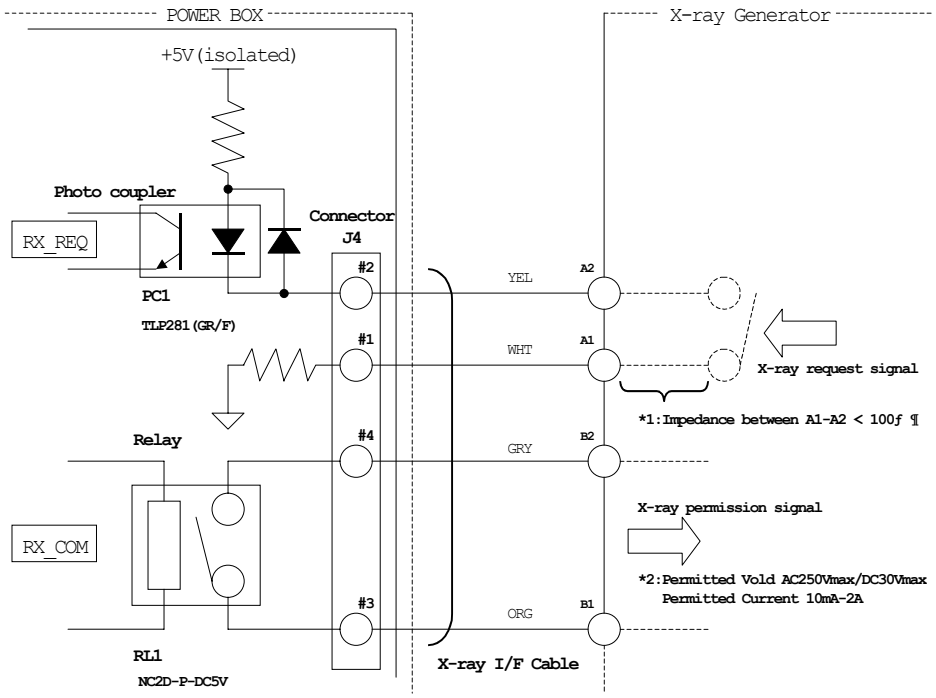
- **During timeout due to RX_REQ not negating**



7.3.2 Signal Names and Functions in the Connection with the X-ray Generator

<X-ray Sync Signal>

Signal name	Functions
RX_REQ	**X-ray exposure signal** Indicates that an X-ray exposure is ordered at the X-ray generator side. This signal needs to be retained at least for $\mathbf{T}_{PREP}$ period. X-ray release signal (RX_COM) is not output if the T_{PREP} is less than the necessary period. It takes about 1 second in the worst case scenario before the operation can be resumed when RX_REQ is negated in this period. Time required to assert RX_COM after receiving the RX_REQ from the X-ray generator $\mathbf{T}_{PREP}$..... **min.0 max.300ms** Since a captured image is read from the sensor when RX_REQ is negated (or RX_COM is time out) as a trigger, reading action is delayed if RX_COM does not negate and time out is used as the trigger, resulting in delay of image display timing. **We recommend using a configuration in which RX_REQ is negated.** Time required from X-ray exposure completion to negating RX_REQ $\mathbf{T}_{RX\_REQ\_NEG}$ .....**min.0 max.100ms** * Image display timing is delayed if this is not fulfilled.
RX_COM	**X-ray release signal** Checks whether or not imaging is ready at the CXDI side after receiving X-ray exposure signal (RX_REQ) from the X-ray generator. This signal is output to the X-ray generator side when imaging is ready. Time required from asserting RX_COM to exposing X-ray $\mathbf{T}_{PRE\_DELAY}$ .....**min.0 max.100ms** * Available imaging time is reduced if this is not fulfilled. Time required to stop X-ray exposure after RX_COM halts $\mathbf{T}_{POST\_DELAY}$ .....**min.0 max.100ms** * Problems such as shading could occur on images if this is not fulfilled.



The connection with CXDI-60G/60C and X-ray generator equipment

Connection conditions

1. The X-ray exposure signal line (including the switching function) must be insulated, and its total impedance must be 100 ohms or less.
2. The maximum contact voltage of the X-ray exposure authorization signal line is AC 250V and DC 30V, and its current ranges from 10mA to 2A.
   Only the insulated secondary power supply can be connected.
3. Protective grounding for X-ray generator should be equipotent with the system.

7.3.3 Rating and Characteristics for Relay and Photo Coupler (on PWB-60XRAY)

(1)RL1 (Power Relay/Plug-in terminal type)

1) Rating (Operational coil)

Rated voltage (V)	Rated current	Coil resistance	Coil Inductance (mH)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption
	(mA)	(Ω)	Armature OFF	Armature ON	(V)	(V)	(V)	(mW)
DC5V	72	69.4	69.5	86.0	below 80%	below 10%	135% (at 50)	Approx 360

2) Rating (Switch/Contact)

types	Single stable
arrangement	2 Form C
Contact material	Au-clad AgNi type
Relating capacity	AC250 5A DC30V 5A
Max. switching power	1250VA 150W
Max. switching voltage	250V AC
Max. switching current	5A
Min. switching capacity	100μA 1V DC

3) Characteristics

Item		Content
Operate time		Max. 20ms
Reset time		Max. 10ms
Maximum open/close frequency	Mechanical	18,000 times/hour
	Rated load	1,800 times/hour
Withstand voltage	Between coil contacts	2,000 Vrms
	Between same poles	1,000 Vrms
Life	Mechanical	$5x10^7$ times
	Electrical	10^5 at 5A 250V AC $5x10^5$ at 5A 30V DC
Ambient temperature		-40°C to +70°C (no freezing nor condensation)
Maximum operating frequency		50 times/Sec.

(2) PC1 (Photo-coupler)

1) Maximum Ratings (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING
LED	Forward Current	I_F(RMS)	50 mA
	Forward Current	ΔI_F/°C	-0.7(Ta≥53°C)
	Pulse forward current[1]	I_{FP}	1 A
	Reverse Voltage	V_R	5 V
DETECTOR	Collector-Emitter Voltage	V_{CEO}	80 V
	Emitter-Collector Voltage	V_{ECO}	7 V
	Collector Current	I_C	50 mA
	Collector Power Dissipation (1 Circuit)	P_C	150 mW
Total Package Power Dissipation (1 Circuit)		P_T	200 mW
Isolation Voltage[2]		BVs	2500 Vms
Operation temperature		T_{opr}	-55 to 100□
Storage temperature		T_{stg}	-55 to 125□

2) Electrical Characteristics (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP	MAX.	UNIT
LED	Forward Voltage	V_F	I_F=10 mA	1.0	1.15	1.3	V
	Reverse Current	I_R	V_R=5 V	-	-	10	μA
	Capacitance	C_t	V=0, f=1 MHz	-	30	-	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=0.5 mA	80	-	-	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	I_E=0.1 mA	7	-	-	V
	Collector Dark Current	I_{CEO}	V_{CE}=48 V Ambient Light Below (100lx)	-	0.01 (2)	0.1 (10)	μA
			V_{CE}=48 V, Ta=85 Ambient Light Below (100lx)	-	2 (4)	50 (50)	
SWITCH CHARACTRISTIC	Rise Time	t_r	V_{CC}=10 V I_C=2 mA R_L=100Ω	-	2	-	μs
	Fall Time	t_f		-	3	-	
	Turn-On Time	t_{ON}		-	3	-	
	Turn-Off Time	t_{Off}		-	3	-	
	Turn-On Time	t_{ON}	V_{CC}=5 V I_F=16 mA R_L=1.9 kΩ	-	2	-	μs
	Storage Time	t_S		-	25	-	
	Turn-Off Time	t_{OFF}		-	40	-	

Note: Because of the construction, leak current might be increased by ambient light. Please use photo-coupler with less ambient light

[1] pulse amplitude 100μs, frequency 100Hz
[2] AC, 1min R.H.≤60 LED side pins shorted together and DETECTOR side pins shorted together

7.4 Network Settings

1. Objective

The imaging part communicates with the control computer by using Ethernet [IEEE802.3u (100Base-TX)] to transfer X-ray images.

The control computer performs DICOM transfer in order to use Ethernet to transfer the obtained images to the printer and storage device.

This section describes how to set up the TCP/IP that is necessary for the network connection.

Set up the following three items:

1) TCP/IP setting for the control computer network card

2) Network setting for Screwcap.ini

3) Network setting stored in the imaging unit.

2. Preparation

- Keyboard
- Mouse

Connect the keyboard and mouse to the back of the control computer.

Check if the system is connected, and then turn the system on.

3. Setup method

3.1 TCP/IP setting for the control computer network card

Perform the set up by referring to “FC-24VE (or FC-E21A) for CXDI Control Station Service Manual” -> the chapter “System Manual” -> “Network Setup”.

Default values

IP Address:192.168.100.10

SubnetMask:255.255.255.0

3.2 Network setting for Screwcap.ini

The CXDI software communicates with the imaging part through Screwcap.dll by using the communication protocol for sending and receiving commands and responses.

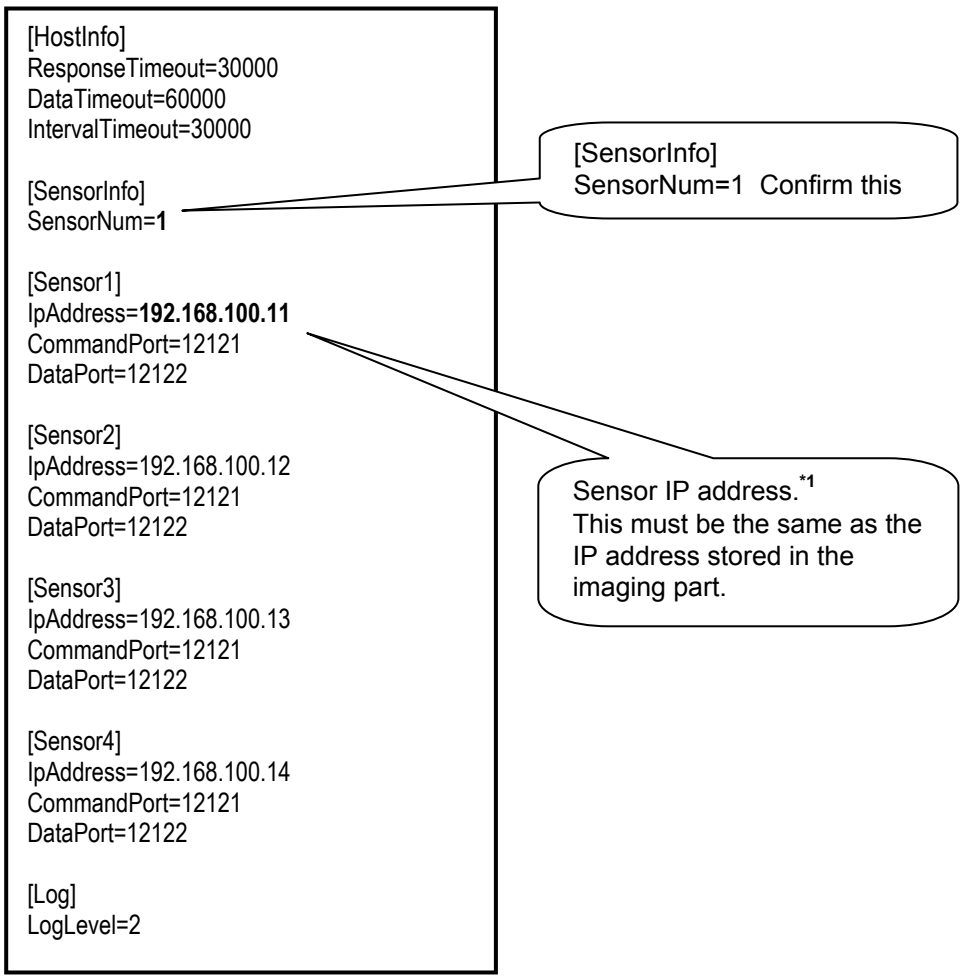
In conjunction with the communication, Screwcap.ini retains the information of the connected imaging unit such as network addresses.

It is necessary to edit Screwcap.ini to communicate with the imaging part.

Since the Screwcap.ini factory setting is the following default setting (see the figure below), it is not necessary to edit the setting unless you changed the network protocol TCP/IP setting for the LAN card that communicates with the imaging unit in the previous item, “3.1 TCP/IP setting for the control computer network card”.

Screwcap.ini is located in the following directory:

D:\ccr\screwcap.ini



*[1] Imaging Unit IP address: This address must be the same as the IP address stored in the next item, “3.3 Network setting stored in the sensor”.

3.3 Network setting stored in the sensor

The factory default setting is shown in the table below.

This setting is not necessary unless you have changed the setting.

Item to be set	Factory default value
Imaging unit IP address	192.168.100.11
Subnet mask	255.255.255.0
Host IP address	192.168.100.10
Port number for command	12121
Port number for data	12122

If you change the setting, refer to “Tool Software Operation Manual for Ethernet” → “Imaging Part IP Address Setting”.

7.5 Setting the Fixed ROI Areas

1) Purpose

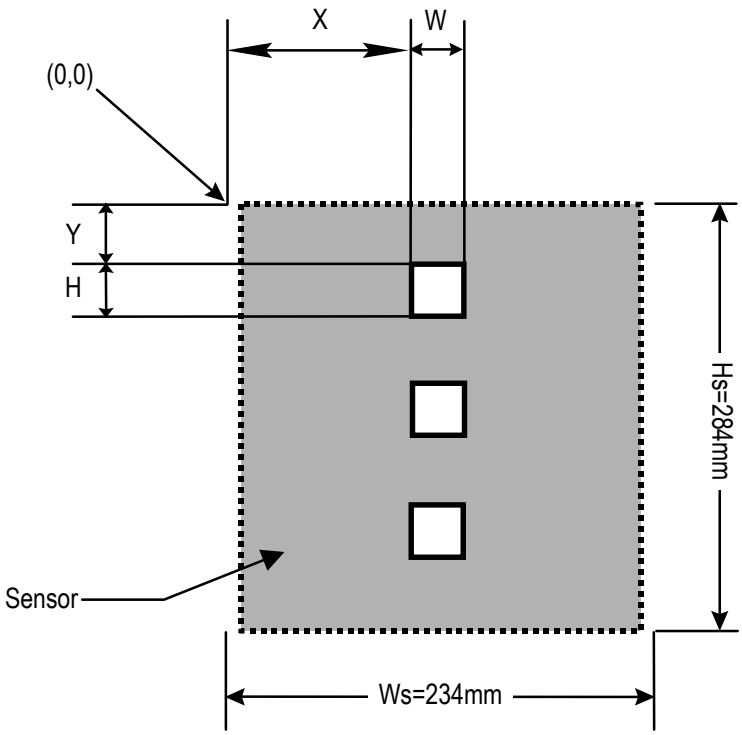
Set the fixed ROI area on the sensor to expose by the fixed ROI area because user can not get the proper image by the Auto ROI area.

2) Setting method

2-1) Investigate the actual size and position of the ROI that is required.

2-2) Designate the SIZE, POSITION, and NUMBER (max 5)* on the sensor.

* However, in the case of using the new function "Display of AEC (Automated Exposure Control) Field in Preview Screen" added from CXDI System Software Ver.6.2, NUMBER that can be specified is max 3.



2-3) Convert the size and position of the ROIs in 2) to pixel values. The pixel size of the sensor is 160μm. For multiple values, use X', Y', W', H', X", Y", W", and H" for calculations.

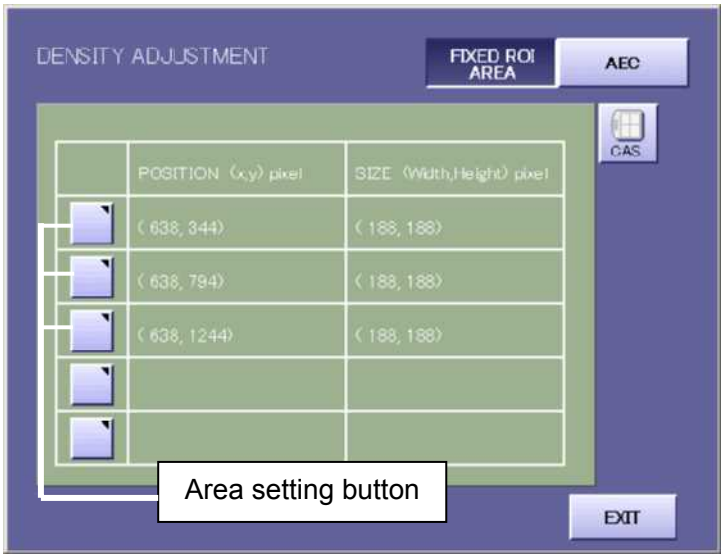
X/160 μm	Let this value equal A
Y/160 μm	Let this value equal B
W/160 μm	Let this value equal C
H/160 μm	Let this value equal D

2-4) Open the "DENSITY ADJUSTMENT CONTROL" screen when the normal imaging screen is active.

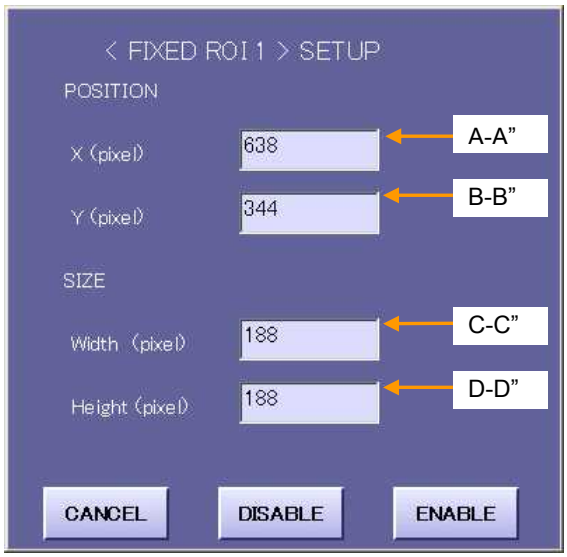
SYSTEM→SETUP MENU→SYSTEM SETTINGS→ DENSITY ADJUSTMENT CONTROL

2-5) The “DENSITY ADJUSTMENT CONTROL” screen appears. Confirm that the sensor is set with a sensor switch button. Press the [Fixed ROI Area] key.

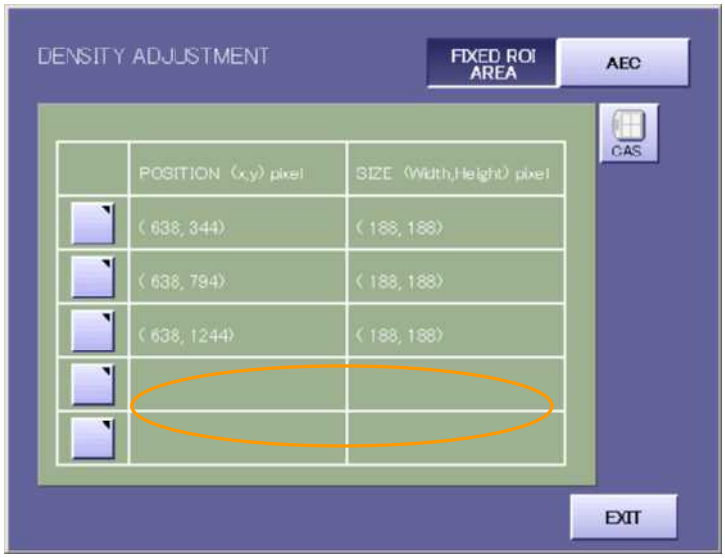
2-6) Press the [Area setting] key.



2-7) The fixed ROI 1 setting screen appears. Input values A to D from step 3) into the edit box, and press [ENABLE]. To set multiple fixed ROIs, input A’ to D’ and A” to D” into fixed ROI 2 settings and fixed ROI 3 settings respectively.



2-8) The display returns to the "DENSITY ADJUSTMENT CONTROL" screen. Confirm that POSITION and SIZE fields not set in step 5) to step 7) are disabled (dimmed). If they are not dimmed, press the [Area setting] key, and press [DISABLE] in fixed ROI * settings.



2-9) After Confirming all settings, and press [EXIT].

2-10) The display returns to the system settings screen. Press [OK].

2-11) "Change settings?" appears. Press [OK]. Be careful, because if [CANCEL] is pressed, all changes made to the settings are deleted.

2-12) Return to the normal imaging screen, and turn off the power to the CXDI.

7.6 Settings

(1) Checking and Setting the Date and Time

Description about CXDI software in 'Setting' may change to some degree depending on the versions of software. For CXDI software, see "New Function Descriptions" issued for every version if necessary.

1) Purpose

The date and time is set to Japan standard time at factory shipment.

Reset the date and time to your local value as necessary.

2) Procedure

2-1) When CXDI application start, open the ADMINISTRATOR SETUP MENU.

SYSTEM → SETUP MENU → ADMINISTRATOR SETUP

2-2) When the "ADMINISTRATOR SETUP MENU" appears, and presses the [DATE] button.

2-3) The dialog (Date / Time Properties) appears, and set the value properly each of the fields which the tab sheet (Date&Time and Time Zone sheet) has. And then press [OK].

(2) Checking the Firmware Version

1) Purpose

1-1) Failing to use the proper versions of the firmware and PLD code with the CXDI software can result in an error, and system operation cannot be guaranteed. Therefore, the versions of the firmware must be checked to ensure that they are correct.

2) Notes

2-1) This check should always be performed at installation, and if necessary, the firmware versions should be upgraded.

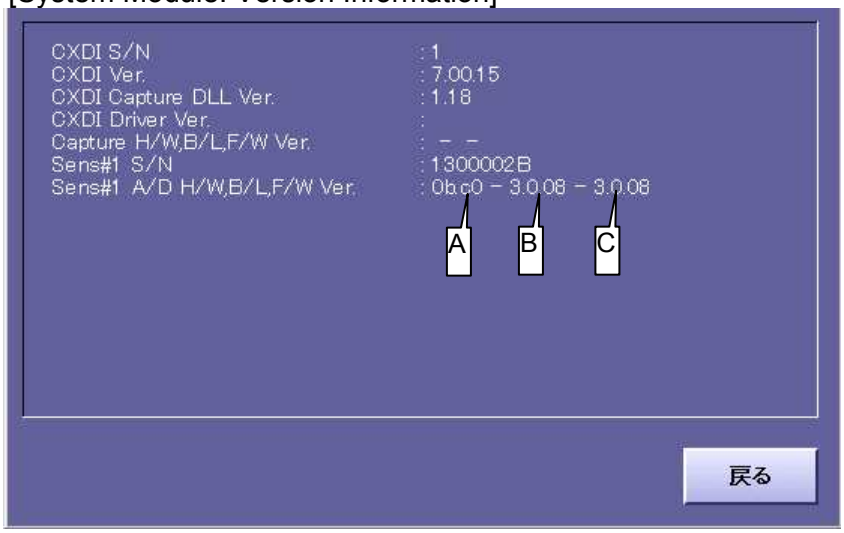
2-2) This check cannot be performed with only the control computer. Connect the imaging units and other equipment, and start up in the normal imaging status.

3) Procedure

3-1) Checking the firmware alone

a. Start up the CXDI software.
b. Display the version information from the user mode.
SYSTEM > SETUP MENU > VERSION INFORMATION
c. Confirm the firmware version.

[System Module: Version Information]



A. Hardware version

Product type: Product type is identified from Sensor serial No. that is set to the Imaging unit. 0b.** indicates 60G and 0f.** indicates 60C.

B. Firmware initialization code version

This is the version of the initialization code written on the PWB-60Di. Initialization code will be downloaded and settings will be reset to the default (factory) settings by turning ON the power while pressing the initialization switch on the power box.

The display “3.0.08” on the screen indicates the version 3.00.08.

C. Firmware normal code version

This is the version of the normal code installed on the PWB-60Di. Usually the system operates with this code. It must be updated as required.

The display “3.0.08” on the screen indicates the version 3.00.08.

3-2) Checking the firmware and PLD code

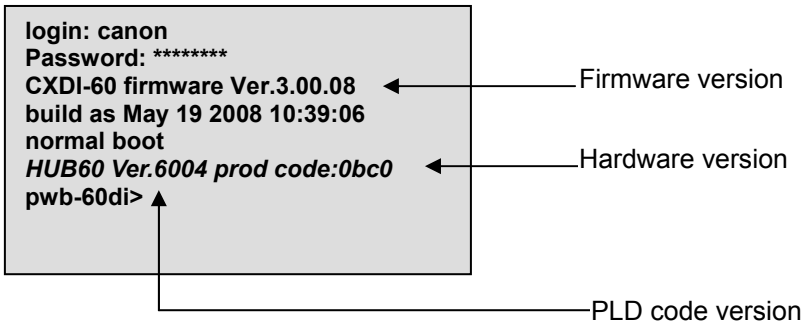
(1) Connect the keyboard and mouse.

(2) Start up the CXDI system.

(3) Close the CXDI software if it starts up.

(4) Connect Telnet by referring to “Telnet Connection” in the Tool Software Operation Manual for Ethernet.

(5) Check the versions of the firmware and PLD code on the screen displayed after the login.



(6) After you finish checking, close HyperTerminal.

(3) Installing Firmware and PLD Code

1) Purpose

Write exposure code and PLD code into the Flash ROM of the PWB-60Di in the imaging unit.

2) Notes

Be sure to check that the CXDI is connected to the system.

3) Procedure

3-1) Installing the firmware

Write the firmware by referring to “Firm Write Tool Software (Firmwrite.exe)” in the Tool Software Operation Manual for Ethernet.

Where to write: PWB-60Di

3-2) Installing PLD code

Write PLD code by referring to “PLD Write Tool Software (pldwrite.exe)” in the Tool Software Operation Manual for Ethernet.

Where to write: PWB-60Di.

(4) Checking the Sensor Serial No.

1) Purpose

If the sensor serial number of the imaging unit differs from the sensor serial number stored in the HD of the Control computer due to replacing the imaging unit, the connected imaging unit cannot be detected after the CXDI software is launched and an error message appears. In that case you need to register the sensor serial number.

2) Notes

2-1) Check the sensor serial number whenever the imaging unit is replaced.

2-2) This checking procedure must be performed with the Control computer, Imaging Unit and all the other equipments connected and started up.

3) Sensor serial number registration

Register the sensor serial No. from CCR Console Menu. Refer to “Identifying the Sensor Units” for details.

(5) Set Up Startup Menu

1) Purposes

1-1) Register the CXDI software to the “Startup Group”.

The CXDI software is started automatically when the CXDI system is turned on.

1-2) Change the window view size

Hide the other application screen view except the CXDI software.

1-3) Delete the CXDI software from the “Startup Group”.

The CXDX software is not started when the CXDI system is turned on.

2) Notes

2-1) The CXDI software is not registered in the “Startup Group” at the factory setting.

Therefore register the CXDI software to the “Startup Group” after the system installation.

2-2) The window view size of the program registered in “Startup Group” has one own size with the each short-cut icon. Be sure to set the window view size of CXDI software at the same time with the register to the “Startup Group”.

3) Register the CXDI software to the “Startup Group” procedure.

3-1) Connect keyboard and mouse to the control computer.

3-2) Turn the all CXDI system power on after the all installation finished. And after that Windows XP starts.

3-3) Open the “Taskbar and Start Menu” from the Start Menu.

Start⇒Settings⇒Taskbar and Start Menu

3-4) “Taskbar and Start Menu Properties” appears. Click “Start Menu” tab, and then click

Taskbar and Start Menu Properties⇒Start Menu⇒Classic Start⇒Menu Customize

3-5) Click Add, and Create Shortcut appears. Click Browse.

3-6) Browse appears. Find a file named “ccrstart.bat” in drive [D:\ccr] and click OK.

3-7) D:\ccr\ccrstart.bat appears in the Command line. Click Next.

3-8) Select Program Folder appears. Select Startup folder and click [Next].

3-9) Select a name for the shortcut appears. Type ccrstart.bat. Click [Finish].

3-10) Close the Taskbar [Start], and login again to Windows XP.

Start⇒Shut Down⇒Log off cxdi.

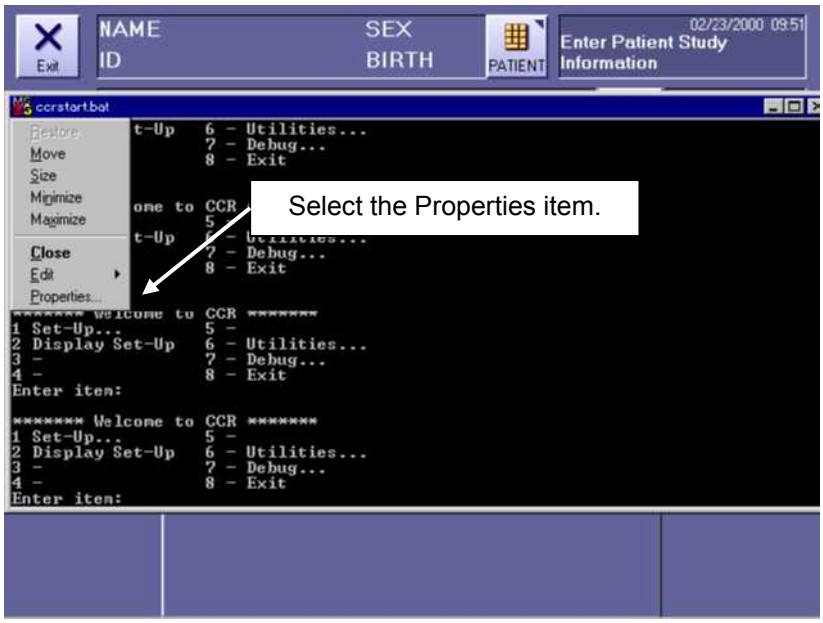
3-11) After login the computer, make sure that the CXDI software starts up.

4) Change the window view size

4-1) After the CXDI software starts, press [Alt] + [Tab] key to show the "CCR Console Menu" prompt screen.

4-2) After the command prompt screen appears, click the icon (called System icon) where is in right-top of its window.

4-3) System icon menu appears. Select Properties from the menu. [Fig 1]



[Fig 1]

4-4) Click the "Font" tab from the "ccrstart.bat" properties and change its size to "6 x 13".

4-5) Click the "Layout" tab and change the "Height" of the "Screen Buffer Size" to 5000. Click [OK].

4-6) The "Apply Properties to Shortcut" appears and check the item of the "Modify shortcut which started this window". Click [OK].

5) Delete CXDI software from the "Startup Menu Group".

5-1) Connect the keyboard and the mouse to the control computer.

5-2) Turns the all CXDI system power on, Windows XP start.

5-3) After the CXDI software start, press [Alt] + [Tab] key to show the "CCR Console Menu" prompt screen.

5-4) Select "8 – Exit" to close the CXDI software on the "Welcome to CCR".

5-5) After the CXDI application software closed and Window XP Desktop appear, open the "Taskbar & Start Menu…" with "Start Menu" tab clicking.

Start>Settings>Taskbar and Start Menu

5-6) "Taskbar and Start Menu Properties" appears. Click "Start Menu" tab, and then click Taskbar and Start Menu Properties⇒Start Menu⇒Classic Start⇒Menu Customize

5-7) The "Remove Shortcuts/Folders" dialog box appears after click the "Remove" button. And double-click the "Startup folder"

5-8) Remove the "ccrstart.bat" item from it.

5-9) After "Remove" button clicked, the confirmation of deleting file appears. If you are going to remove it, click "Yes" button.

5-10) After confirm that the "ccrstart.bat" item is removed from "Startup Group", close all the application on the desktop and re-login to Windows XP.

5-11) Make sure that the CXDI software will not start automatically after login to Windows XP. And then shutdown Windows XP, turn the CXDI system power off.

* When the CXDI software is deleted from the Start menu due to repair or other reasons, be sure to always perform the procedures outlined in "Adding CXDI software onto the Start menu" and "Changing the window size" when the repair is complete.

(6) Identifying the Imaging Units

1) Purpose

In order for the control computer to identify the imaging units connected, the sensor serial number of each imaging unit is input to the Control computer.

2) Notes

2-1) These operations must always be implemented at the installation stage and when any of the Imaging Units (sensor) or Control computer (hard disk) has been replaced or when the combination of equipment has been changed.

2-2) The sensor serial numbers must always be input. If the serial numbers of the imaging unit and Control computer do not match, "Sensor Unit: Detect Error (-5100)" will be displayed on starting up the CXDI software. These numbers are the same as what is input to the PWB-60Di. (Refer to " Checking the sensor serial numbers".)

3) Preparations (What to have ready)

Tool keyboard, tool mouse

4) Procedure

4-1)Start the CXDI software.

4-2) Once the normal sensor screen has appeared on the operation unit, use the keyboard to enter the debugging mode (Use [ALT] + [TAB].).

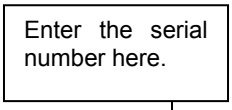
4-3) "Welcome to CCR" appears. Select "1 Set-Up..."

4-4) "Setting Mode (0:Normal, 1:Expert)[0=0x0]:" appears. Select "0:Normal."

4-5) "CCR SETUP MENU" appears. Select "7 Scan Sensor Setup."

4-6) The "Capture Device Configuration Table" appears. Input "1" in "Max Capture Devices" shown below.

4-7) Enter the serial number to "A/D Board Serial Number for SensorID#1".



@@@@@@@ Capture Device Configuration Table @@@@@@@
Max Capture Devices [1=0x1]:**1**
@@@@@@@@ Capture Device Configuration No.0 (SensorID#1 OPU)@@@@@@@@
-------A/D Board Serial Number 0-0 –> 60G: 0x13000000
A/D Board Serial Number for SensorID#1 [0x13000000=318767104]: 13000000
Custom Type [0:NO CUSTOM 1:STAND 2:TABLE 3:UNIV 4:CASSETTE 100um 5:CASSETTE 14X17_160um 6:CASSETTE 9X11_160um] [0=0x0]:0
Field of View Rotation (0:No 1:Yes) [0=0x0]:0
Constant for Exposure Index [-1.000000]: -1.000000
---- Need to re-start program to validate this change.

4-8) When "CCR SETUP MENU" appears, press the [Esc] key to return to "Welcome to CCR."

4-9) Select the command "8 - Exit" from "Welcome to CCR" menu to exit the CXDI software.

4-10) After "Windows XP desktop" screen appears, start the CXDI software again.

* Restart the CXDI software. The screen displays the following message: Alert System Info Error (-6) A/D board info is updated. Click "OK".

*CXDI-60G sensor serial number: 1300****

*CXDI-60C sensor serial number: 1710****

(7) Entering Control Computer Serial Number

1) Purpose

Set the product serial number (Control computer) to the “Device Serial Number” of the “DICOM header”.

2) Procedure

2-1) Start up the CXDI system.

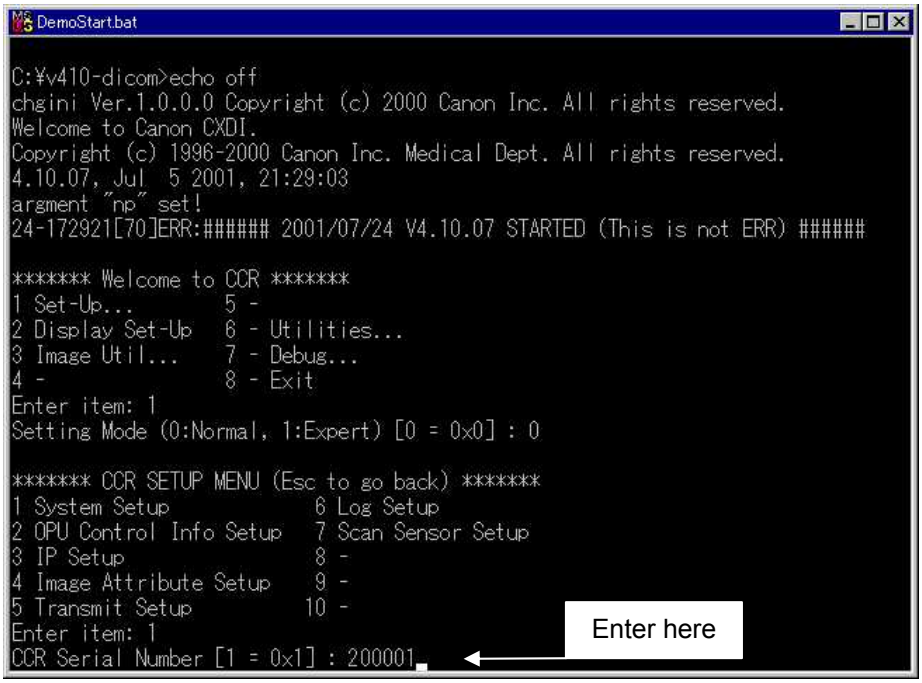
2-2) After the exposure screen appears on the operation unit, use the keyboard to enter Debug mode. (Use [Alt] + [Tab].)

2-3) “Welcome to CCR” screen appears. Select the command “1. Set-Up…”

2-4) The “Setting Mode (0: Normal, 1: Expert) [0=0×0]:” is prompted. Select “0: Normal”

2-5) “CCR SETUP MENU” appears. Select the command ”1. System Setup”.

2-6) “CCR Serial Number [0=0×0] : ” appears. Enter the six-digit number indicated on the naming label of the control computer unit. Press [Enter] key until “CCR SETUP MENU” appears. [Fig 1]


DemoStart.bat
C:¥v410-dicom>echo off
chgini Ver.1.0.0.0 Copyright (c) 2000 Canon Inc. All rights reserved.
Welcome to Canon CXDI.
Copyright (c) 1996-2000 Canon Inc. Medical Dept. All rights reserved.
4.10.07, Jul 5 2001, 21:29:03
argment "np" set!
24-172921[70]ERR:###### 2001/07/24 V4.10.07 STARTED (This is not ERR) ######
******* Welcome to CCR *******
1 Set-Up... 5 -
2 Display Set-Up 6 - Utilities...
3 Image Util... 7 - Debug...
4 - 8 - Exit
Enter item: 1
Setting Mode (0:Normal, 1:Expert) [0 = 0x0] : 0
******* CCR SETUP MENU (Esc to go back) *******
1 System Setup 6 Log Setup
2 OPU Control Info Setup 7 Scan Sensor Setup
3 IP Setup 8 -
4 Image Attribute Setup 9 -
5 Transmit Setup 10 -
Enter item: 1
CCR Serial Number [1 = 0x1] : 200001
Enter here

[Fig 1]

2-7) Press [Esc] key after “CCR SETUP MENU” appears to return to “Welcome to CCR” screen.

2-8) Select “8-Exit”to exit CXDI software.

2-9) This returns you to the Windows NT desktop. Restart the CXDI software, and perform the procedure from steps 2) to 5). Check that the serial number for the “CCR Serial Number” item was entered correctly in step 6).

(8) Table Setup Settings

1) Purpose

Adjust the CXDI operation unit's TABLE SETUP to match the exposure conditions (X-ray tube voltage, X-ray tube current, msec or mAs value) of the X-ray generator.

2) Procedure

2-1) Start the CXDI software.

2-2) Open the TABLE SETUP Change window from the Normal Exposure window.

System ⇒ SETUP MENU ⇒ SYS. SETUP ⇒ TABLE SETUP

2-3) Select the tabs to be changed and change the X-ray tube voltage, X-ray tube current, and msec value data to match the exposure conditions of the X-ray generator.

* See the operation manual for the details of settings.

2-4) After finishing the changes, return to the Normal Exposure window and check that the TABLE SETUP has been changed.

(9) Performing the Annotation Settings

1) Purpose

The settings for imprinting the annotation onto the film and the settings of the characters used for the annotation are performed.

2) Procedure

2-1) Once the normal radiographic screen has started, open the annotation setting screen.

SYSTEM → SETUP MENU → SYS. SETUP → ANNOTATION

2-2) The annotation setting screen now appears. Proceed with the settings that will make it possible to put the data desired by the user.

*** See the operation manual for the details of settings.**

(10) Network Connections

Network settings

1) Purpose

These settings are for connecting the CXDI to the network.

1-1) Set the CXDI's IP address, subnet mask and default gateway in Windows XP.

1-2) Set the printer and storage output destinations and parameters on the user screen.

2) Checkpoints

2-1) This item involves checking the details of the checks performed on network setting parameters among the pre-installation inspection details and setting these parameters.

*** Refer to "Appendix: Investigation Report" for the pre-installation investigation details.**

2-2) Perform the settings of this item carefully since any errors made in these settings will make it impossible for connection to be made to the network or the images to be transmitted properly, etc.

3) Windows XP settings

3-1) Connect the keyboard and mouse to the control computer.

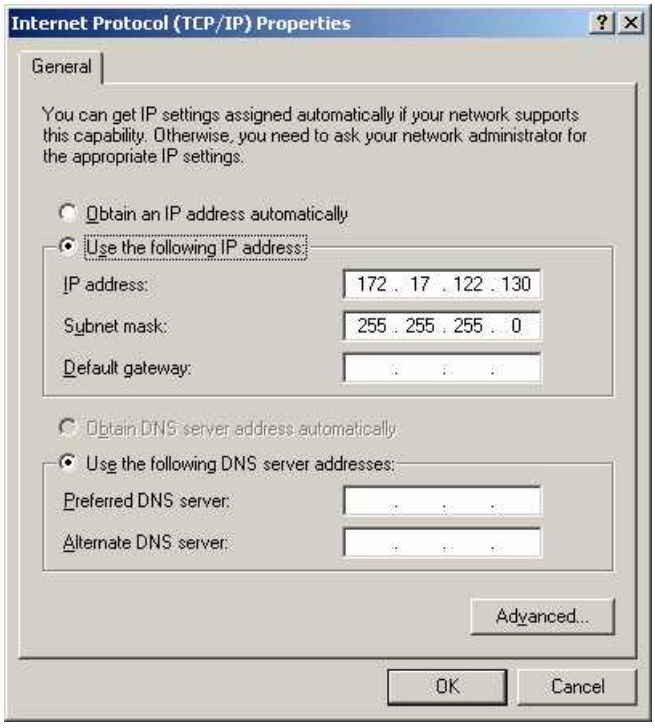
3-2) After turning on the Operation unit's power and then the Control computer's power, start Windows XP.

3-3) The Windows XP desktop screen appears. Right-click the [My Network] icon, and select My Network Places from the menu.

3-4) When [Network Connection] appears, double click on Local Area Connection (Intel(R) PRO/1000 MT Network Connection).

3-5) When Local Area Connection Properties appears, click on the General tab, select [Internet Protocol (TCP/IP)], and click Properties.

3-6) Based on the pre-install of inspection details set the IP address, subnet mask and default gateway.


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
172 . 17 . 122 . 130
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

[Fig 1]

3-7) Upon completion of the setting, restart the Windows XP.

3-8) Check the communication test in the sequence below to verify whether the CXDI is now part of the network. To check the connections at the TCP/IP level, use the "ping" command from the command prompt.

Start → Programs → Command Prompt

When the IP address of the connection destination is "173.17.7.123," for instance, the following messages will be repeated.

- If the CXDI has been connected properly:
  Pic:>ping 172.17.7.123 (input on the DOS screen)
  Pinging 17217.7.123 With 32 bytes of data:
  Reply from 172.17.7.123:bytes=32 time <10ms TTL=255
  Reply from 172.17.7.123:bytes=32 time <10ms TTL=255
  Reply from 172.17.7.123:bytes=32 time <10ms TTL=255
  Reply from 172.17.7.123:bytes=32 time <10ms TTL=2550

- If the CXDI has not been connected properly:
  Pic:> ping 172.17.7.123 (input on the DOS screen)
  Pinging 17217.7.123 With 32 bytes of data:
  Request time out
  Request time out
  Request time out
  Request time out

4) Set the printer and storage device which serves as the external output destinations. In this case, one printer and one storage device are set.

4-1) Printer settings

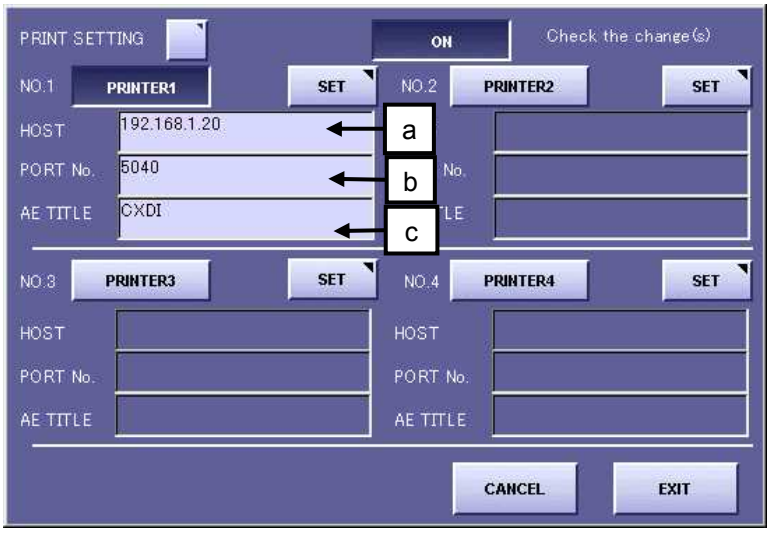
A. Open the output destination setting screen from the user menu.

System → SETUP MENU → DESTINATION → PRINTER

*** Up to four printers (2 of which can be used for output at the same time) can be set.**

B. Press the "Printer1" button, and input the following items based on the pre-installation investigation details.

a. Printer host name (IP address) b. Port number c. Transmission destination title

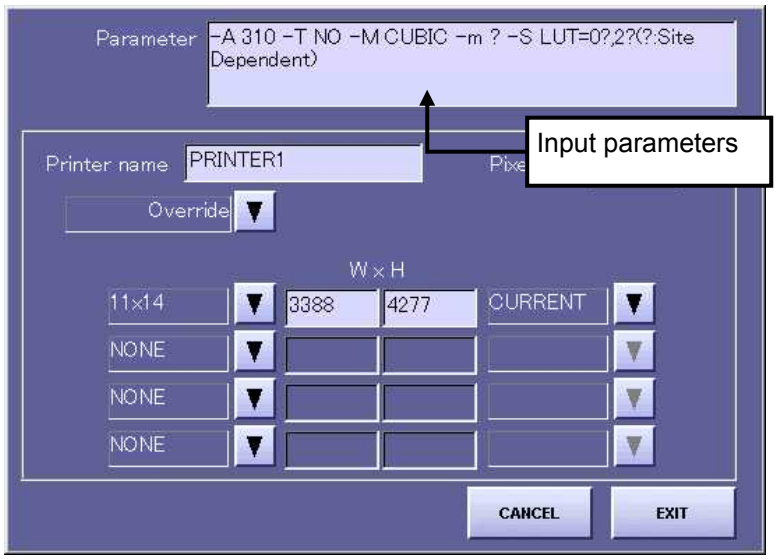


[Fig 2]

C. Press the "SET" button, and input the parameters of the printer to be connected based on the pre-installation inspection details. (Refer to another sheet for details of the parameters.)

*** A space delimiter must be input between each of the parameters.**

By pressing the "Override" button, you can select a printer from all the registered printers. In this case, basically you do not have to enter parameters. However, if "?" is displayed within the parameters, you may have to enter the required parameter at the user's site.

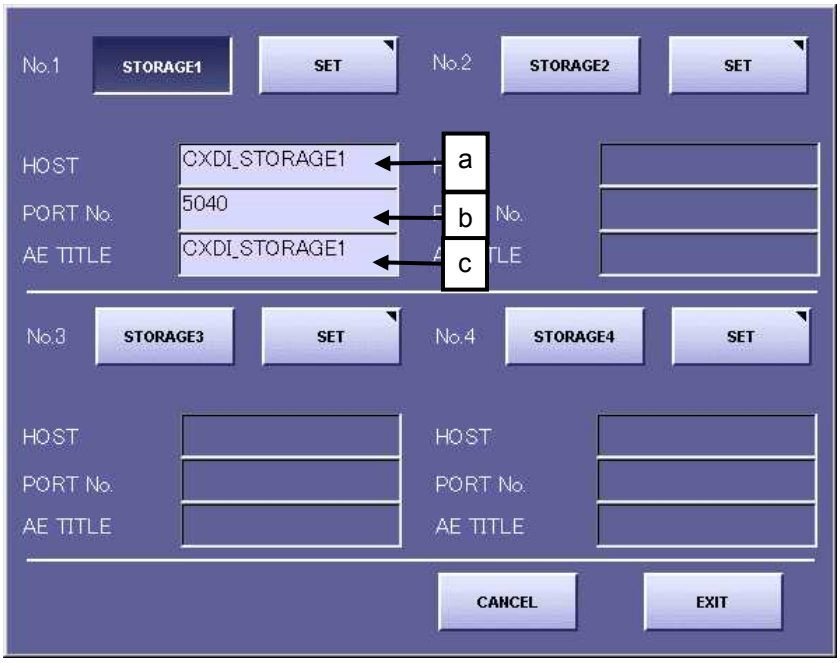


[Fig 3]

4-2) Storage settings

A) Open the output destination setting dialog from the user menu.
System → SETUP MENU → DESTINATION → STORAGE
*** Up to four storage units (2 of which can be used for output at the same time) can be set.**

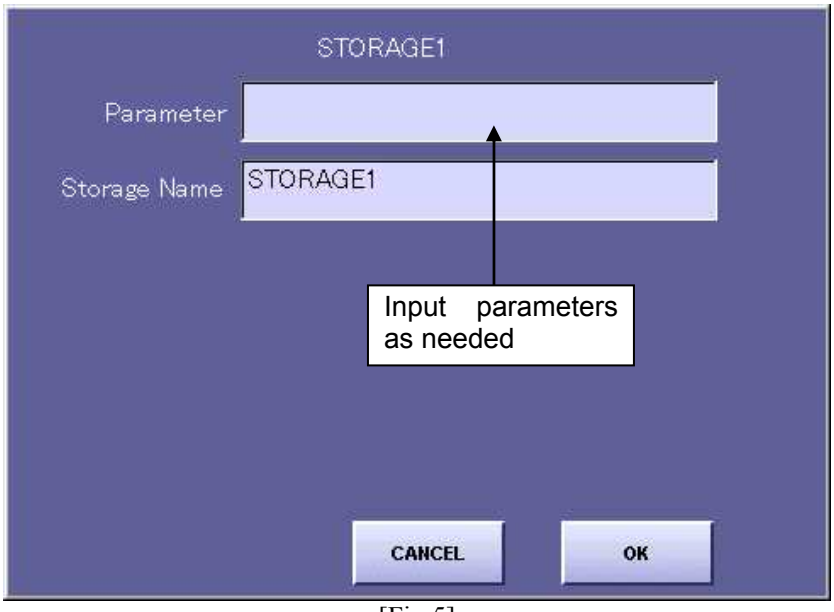
B) Press the "Storage1" button, and input the following items based on the pre-installation investigation details.
a. Storage host name (IP address) b. Port number c. Transmission destination title



[Fig 4]

C) Press the "SET" button, and input the parameters.
(Normally, the parameters need not be set. They must be input only when the need arises.)

*** A space delimiter must be input between each of the parameters.**



[Fig 5]

D) After setting the output destinations, follow the procedure below to check whether images can actually be transmitted. Return to the user menu, capture a sample image (one X-ray image), and transmit the image to the printer and storage. There are two errors that may result if the image cannot be transmitted:

a. “DICOM Connect Error. Cannot connect to the target. Check network or port number setting. Retry?”

b. “DICOM Transfer Error. Error occurred during the association. Retry?”

Message (a) indicates that connection at the TCP/IP level is not possible and that the physical connections or the subnet mask and other settings must be checked again.

Message (b) indicates that communication at the TCP/IP level is problem-free but that DICOM level communication has failed. In this case, check again that AE_TITLE of CXDI has been sent properly to the transmission destination and that the IP address, port number and AE_TITLE of the transmission destination which are set with CXDI have been set properly.

*** “AE_TITLE” of the transmission destination is case sensitive fields. (Permit upper-case letter or lower case letter, etc)**

Parameter List (Separate Document 1)

DICOM storage device

The parameter settings for DICOM Storage transfer used in CXDI are described below.

Parameter	Meaning	Description
-m maxPDU Maximum PDU value in byte units	* The CXDI automatically uses 131072 internally for operation. * Designating a specific value allows overwriting of the above value.	* The DICOM standards do not allow values of 1301073 or higher to be set. * This is used when the operator who manages the connected storage device requests a size change. * In DICOM printing, note that the argument title changes to -u. (→ See the printing parameters.)
-t calledTitle Called App Entity Title	* The AE Title setting field is automatically applied to this setting. * Designating a specific value allows overwriting of the above value.	* Note that the meaning is opposite of the DICOM printing argument –t. (→See the printing parameters.) * The entry for the OPU output device title is used here.
-c callingtitle calling App Entity Title	* The CXDI automatically uses CANON_CCR internally for the operation. * Designating a specific value allows overwriting of the above value.	* Note that the meaning is opposite of the DICOM printing argument -c. (→See the printing parameters.) * This is used when the operator who manages the connected storage device requests a change in the installed identification information (version).
-s SOPName (for reference) This parameter designates whether class be connected for performing association at the beginning of transfer.(CR/T/MR/NM/SC/US)	* This is not used in the CXDI.	
-I A-RELEASE-RES is ignored.	* This parameter is used simply as “-I”	* This is used when the error message “130012 Peer aborted Association (or never connected)” occurs even though the DICOM data transfer was successful. → This is used differently based on the connected storage devices.
-d FAC This parameter dumps a specific facility log. (DCM/DUL/SRV)	* This parameter is used simply as “-d” * This parameter is used to make the transfer software put the debugging character string on the console.	* This parameter does not affect DICOM data transfer. * This parameter outputs the CXDI log based on Windows NT.

Parameter	Meaning	Description
-v This parameter dumps the transfer log.	* This parameter is used simply as "-v". * DUL and SRV are dumped. * This parameter is used to make the transfer software put the debugging character string on the console.	* This parameter does not affect DICOM data transfer.
-jn This is the time to take timeout.	* Sets the time to take timeout in seconds.	* This parameter is to be changed when taking timeout.
-k level=0 1 2 3	* A variety of specifications have since been needed in conjunction with DICOM modality LUT support.	If DICOM Modality LUT OD is enabled, set appropriate options to suit each output destination.

Argument: Values necessary for executing a function, subroutine, procedure, or other operation is passed to them. Arguments are assigned to functions and subroutines when executed. For example, the argument in f (x) is x.
PDU: Protocol data unit
The types of PDU's include get-request, get-next-request, get-response, set-request, nd trap.

Note

For details about the "-v" parameter, see "Checking the Error Log".

Note

The parameters "-v" and "-d" put the log on the console. Therefore, be sure to always erase these parameters before operation by the user.

If –k:DICOM Modality LUT OD is enabled, set appropriate options to suit each output destination.

level = 0: Do not delete (default when not specified)
1: Delete Window Center/Width
2: Delete Window Center/Width and Rescale Intercept/Slope/Type
3: Delete Rescale Intercept/Slope/Type (compatible with releases up to Ver.4.20)

Other than a loadable LUT or γ=1.0 has been specified with the output destination-specific LUT function.
For storage: Specify -k3(or -k2).
If IMG Rescale Type = 0D is unidentifiable to storage, resulting in an error: Specify -k3.
(If only one storage is connected, simply set DICOM Modality LUT OD to "Disabled.")
The implementation allows Window Center/Width with Rescale Type = 0D specified to be interpreted as "optical densityx1000."
For storage: Specify -k1.
The CXDI Window Center/ Width output value (implementation) is fixed at 2048/4096.)

Note

With AGFA impax Ver. 4.5.0, the specification of -k0 demonstrated a successful density-intensity conversion. But because the corresponding text in the DICOM specifications document is ambiguously written such that the status of implementation by other manufacturers is unknown, please be advised to consult the storage manufacturer for each connection destination or work out on a trial and error basis. Also note that an external storage option specification (if (DICOM modality LUT OD is set to "Enabled," OD tags <0028, 1052 - 1054> are assigned and Level: 0 is assumed) is not supported.

Parameter List (Separate Document 2)

DICOM printer

In the CXDI, DICOM printers are administered separately according to printer product.

The parameter settings for DICOM printer used in CXDI are described below.

Parameter	Meaning	Description
-C copies This parameter uses a number to designate the number of copies.(1/2/...)	* This parameter is used in the DICOM Basic Film Session (2000, 0010). * When the number of copies is designated, film sheets are printed in the quantity specified in a single printing operation. * This parameter is necessary when printing multiple sheets for a single data transfer operation.	* This parameter is set according to the user's requirement. * In the DICOM library TYPE3, the value is transferred together with the Tag. However, if the value is unknown, the value is either is transferred as a character string with length 0, or the element itself is not transferred. → The printer default values are used if this parameter is not entered.
-y priority Priority in the DICOM printer (HIGH/MED/LOW)	* This parameter is used in the DICOM Basic Film Session (2000, 0020). * This parameter determines where this transfer image is inserted into the queue in the DICOM printer. At HIGH, the image is printed first among the queued images.	* This parameter is set according to the user's requirement. * In the DICOM library TYPE3, the value is transferred together with the Tag. However, if the value is unknown, the value is either transferred as a character string with length 0, or the element itself is not transferred. → The printer default values are used if this parameter is not entered. * Note this parameter does not determine where this transfer image is inserted into the CXDI queue.
-D destination Film destination (MAGAZINE/PROCESSOR/BIN_i)	* This parameter is used in the DICOM Basic Film Session (2000, 0040). * Film is sent to the output device designated by RECEIVE MAGAZINE or the automatic developer.	→ The printer default values are used if this parameter is not entered. * The film is usually discharged to the default output device.
-F film type Film media type ("BLUE FILM" / "CLEAR FILM" / "PAPER")	* This parameter is used in the DICOM Basic Film Session (2000, 0030). * Film is printed as the designated film type.	→ The printer default values are used if this parameter is not entered. * Although many types of films cannot be detected, the film type can be selected in the KELP2180. * In this parameter, be sure to put quotation marks (" ") around 0x20 since it comes between BLUE and FILM.

-L session Label Film session label (character string)	* This parameter is used in the DICOM Basic Film Session (2000, 0050). * The label for the film session is for designation purposes only, and generally it is not displayed directly on the print image.	→ The parameter is not transferred over DICOM if it is not designated. * This parameter may be displayed in some form or another depending on the installed printer. For example, it may be displayed in the Control Panel for the printer or in the corner of the film.
-f films Number of film box to be printed	* Currently, this parameter is not operating.	
–i Format Format at print	* This parameter is used in the DICOM Basic Film Box (2010, 0010). * This is not necessary, as for automatically designated on CXDI.	* If this parameter is not designated, transfer software uses automatically STANDARD1 1, for reason this parameter must be transferred in the DICOM.
-l FilmSizeID Film size 14 inch x 17 inch / 17 inch x 14 inch / 11 inch x 14 inch / -l FilmSizeID / 10 inch x 14 inch 10 inch x 12 inch / 24 cm x 24 cm / 24 cm x 30 cm	* This parameter is used in the DICOM Basic Film Box (2010, 0050). * This parameter designates the size of the film to be printed	→ The parameter is not transferred over DICOM if it is not designated. In this case, the printer default values are used. When this parameter is not transferred, problems can occur since unsuitable default values may be used. * Some printers do not print until a supply magazine of the designated size is loaded, and others print even though the designated size is different from the currently loaded supply magazine.
-M magnification Interpolation method (NONE/REPLICATE/BILINEAR/CUBIC)	* This parameter is used in the DICOM Basic Film Box (2010, 0060). * This parameter designates the interpolation method since the printer has a higher resolution than the CXDI in most cases. * Generally, CUBIC provides the best results, followed by BILINEAR. The REPLICATE option is not suitable for CXDI image applications.	→ The printer default values are used if this parameter is not entered. When this parameter is not transferred, problems can occur since unsuitable default values may be used.
-m smoothing Type of smoothing (character string)	* This parameter is used in the DICOM Basic Film Box (2010, 0080). * This parameter designates the smoothing method for the image. * In the DICOM standards, this parameter setting is valid only when CUBIC is selected for the magnification parameter above. * In the DICOM standards, value to be transferred is not predetermined.	→ The parameter is not transferred over DICOM if it is not designated. In this case, the printer default values are used. When this parameter is not transferred, problems can occur since unsuitable default values may be used. * This parameter is determined by asking the printer engineer or by viewing the conformance statement.

	* The designation method varies according to the printer. For example, the MLP190 uses -m NORMAL.	
-S configuration Adjustment information (character string)	* This parameter is used in the DICOM Basic Film Box (2010, 0150). * This parameter sets the printer (image quality) adjustment from the SCU side. * In the DICOM standards, value to be transferred is not predetermined. * The designation method varies according to the printer.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. When this parameter is not transferred, problems can occur since unsuitable default values may be used. * This parameter is determined by asking the printer engineer or by viewing the conformance statement.
-O Orientation Film orientation (PORTRAIT/LANDSCAPE)	* This parameter is used in the DICOM Basic Film Box (2010, 0040). * In versions before 2.0, printers must operate based on this parameter. * When using image cutout from 17 x 17 inch size in the CXDI, this parameter is set and transferred automatically.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. * Starting from version 2.0, the image can be rotated from the CXDI side without using this parameter.
-A max_density Maximum density (Dx100)	* This parameter is used in the DICOM Basic Film Box (2010, 0130). * This parameter designates the density of the digital value for 0 (4095 for reverse display) of the CXDI transfer data image pixels. (In the CXDI, 0 indicates black.) * In the CXDI, this parameter is used to adjust the density. Therefore, be sure to always check that it is operating.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. When this parameter is not transferred, problems can occur since unsuitable default values may be used.
–a min_density Minimum density (Dx100)	* This parameter is used in the DICOM Basic Film Box (2010, 0120). * This parameter designates the density of the digital value for 4095 (0 for reverse display) of the CXDI transfer data image pixels. (In the CXDI, 4095 indicates white.) * This parameter is not transferred in many cases since the minimum density cannot be increased in most printers.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. When this parameter is not transferred, problems can occur since unsuitable default values may be used.

-B border_density Border density (Dx100) (BLACK/WHITE/D x 100)	* This parameter is used in the DICOM Basic Film Box (2010, 0100). * This parameter determines the area density around the image on the film.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used.
-G empty_image_density Empty image density (BLACK/WHITE/D x 100)	* This parameter is used in the DICOM Basic Film Box (2010, 0110). This parameter designates the density of the empty image area during multi-formatting.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used.
-T trim Trimming (NO/YES)	* This parameter is used in the DICOM Basic Film Box (2010, 0140). * This parameter adds lines around the image. * The CXDI is normally adjusted so that the trimming does not appear.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. * For example, the default value for this parameter in Agfa printers is YES. Therefore, the NO option needs to be specifically designated if it is desired.
-P polarity Polarity (NORMAL/REVERSE)	* This parameter is used in the DICOM Basic Image Box (2020, 0020). * Reverse image density	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used.
-r pixel_pitch Transfer pixel pitch for designating the request image size (Pixel Pitch in um)	* This parameter is used in the DICOM Basic Image Box (2020, 0010). * Position of the image on film * The cumulative value for the horizontal size of the image (raw) at the designated pixel pitch is used for the request image size. * The CXDI automatically uses 131072 internally for operation. * The above value can be overwritten by designating a specific value.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the type of image that is printed depends on the settings at the printer side.
-N annoFmt Annotation position (1/2/3)	* This parameter is used in the DICOM Basic Annotation Box (2030, 0010). * This parameter designates the position of the character string to be annotated.	* If using annotation, always be sure to transfer the annotation position.
-n annotation Annotation (character string)	* This parameter is used in the DICOM Basic Annotation Box (2030, 0020). * This parameter designates the character string to be annotated.	* If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. * Also, in this case, the type of image that is printed depends on the settings at the printer side.

-u maxPDU Maximum PDU value in byte units	* The CXDI automatically uses 131072 internally for operation. * The above value can be overwritten by designating a specific value.	* The DICOM standards do not allow values of 1301073 or higher to be set. * This parameter is used when the operator of the connected storage device requests a size change. * In DICOM storage devices, note that the argument title changes to -m. (→See the storage device parameters.)
-c callingTitle Called App Entity Title	* The AE Title setting field is automatically used in this setting. * The above value can be overwritten by designating a specific value.	* Note that the meaning is opposite of the argument -c for DICOM storage devices. (→See the storage device parameters.) * The entry for the OPU output device title is used here.
-t callingTitle Calling App Entity Title	* The CXDI automatically uses CANON_CCR internally for the operation. * The above value can be overwritten by designating a specific value.	* Note that the meaning is opposite of the argument -t for DICOM storage devices. (→See the storage device parameters.)
-g N-GET Printer compatibility mode	*This parameter is used simply as "-g". * In the CXDI default settings, the printer information is not designated. In this case, the printer side sends all the information that it has (DICOM official specifications). * When the -g option is added, the essential information only is collected. This information includes the Printer Status and Printer Status Info. (To prevent installation when the printer does not satisfy the above DICOM specifications.)	→ Normally, this option is not used. This parameter has been provided as a remedy when a printer error occurs when optional devices are not used.
-s Silent mode	* This parameter is used simply as "-s". * This parameter is used to prevent the transfer software from displaying the debugging character string on the console.	* This parameter does not affect DICOM data transfer. → Silent mode does not need to be designated since the CXDI automatically makes the setting internally.
-p This parameter dumps the association parameter.	* This parameter is used simply as "-p". * This parameter is used to set the transfer software so that the debugging character string is displayed on the console.	* This parameter does not affect DICOM data transfer.
-v This parameter dumps the transfer log.	* This parameter is used simply as "-v" * This parameter is used to set the transfer software so that the debugging character string is displayed on the console.	* This parameter does not affect DICOM data transfer.

	* Both the -p and -v parameters should be used. These settings override the -s parameter.	
-V filename This parameter dumps the transfer log.	* The parameter is used for analysis after the transfer software saves the debugging character string displayed on the console to a file with a designated filename. It is used only when problems occur.	* This parameter does not affect DICOM data transfer.
-I A-RELEASE-RES is ignored.	* This parameter is used simply as "-I"	* This is used when the error message [130012 Peer aborted Association (or never connected)]occurs even though the DICOM data transfer was successful. → This is used based on the connected printers.
-jn This is the time to take timeout.	* Sets the time to take timeout in seconds.	* This parameter is to be changed when taking timeout.
-k level = 0 1 2	* The -k option has been implemented to normalize DICOM headers	

Note

The parameters -p, -v, and -V filename display the log on the console. <u>Therefore, be sure to always erase these parameters before operation by the user.</u>

In the past, -k2 was used to fix troubles, but it has now been set as the default has been changed to -k2 to ensure precise compliance with the DICOM code. At sites wishing to adhere to their existing window values, -k1 should be used.

level: 0:Do not delete DICOM tags. (Transfer all headers similar to storage.)
1:Delete Groups 0008, 0010, 0018, 0019 and 0020.
2:Delete Groups 0008, 0010, 0018, 0019, 0020 and Elements (0028,0030), (0028,1050), (0028,1051), (0028,1052), (0028,1053), (0028,1054). Default

Image Pixel Spacing (0028,0030)
Window Center (0028,1050)
Window Width (0028,1051)
Rescale Intercept (0028,1052)
Rescale slope (0028,1053)
Rescale Type (0028,1054)

For groups 0008, 0010, 0018, 0019, 0020, refer to DICOM manifesto.

Examples of parameters used with different makers and types of printers (reference)

Name	Default Parameters	Significance
Kodak MLP190	-A 320 -T NO -M CUBIC –m NORMAL -S CS000 (entered in param member) 80 (entered in pixelPitch member) 14 x 17 4096 (entered in W member) 5120 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing: normal • Maximum density: 3.20 • Curve shape 0 (density linear) as Config Info
Kodak KELP2180 + Kodak Print Spooler Model 100	-A 320 -T NO -M CUBIC –m NORMAL -S CS000 (entered in param member) 79 (entered in pixelPitch member) 14 x 17 4090 (entered in W member) 5120 (entered in H member) 11 x 14 3194 (entered in W member) 4096 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing: normal • Maximum density: 3.20 • Curve shape 0 (density linear) as Config Info
Agfa DryStar 3000	-A 320 -T NO -M CUBIC -m 140 -S “PERCEPTION_LUT=200” (entered in param member) 80 (entered in pixelPitch member) 14x17 4256 (entered in W member) 5174 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing: slightly sharp (edges emphasized) • Maximum density: 3.20 • S “PERCEPTION_LUT=200(LINEAR)” (If the output fails to be linear with “LINEAR”, on-site adjustments with the printer manufacturer must be performed.
Kodak Imation DryView 8700 + Pacs LINK IMN 9410	-A 310 -T NO -M CUBIC -m ? -S LUT=0?, 2? (?: Site Dependent) (entered in param member) 78 (entered in pixelPitch member) 14x17 4096 (entered in W member) 5220 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing must be adjusted at the user’s site. • Maximum density: 3.10 • S LUT = m, n is designated as the Config Info but m and n are adjusted on-site by the Kodak service engineer. Basically, adjustment is performed to achieve a linear output.
Kodak Imation DryView 8700 + GW	-A 310 -T NO -M CUBIC -m ? -S LUT=?, ? (?: Site Dependent) (entered in param member) 78 (entered in pixelPitch member) 14x17 4096 (entered in W member) 5220 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing must be adjusted at the user’s site. • Maximum density: 3.10 • S LUT = m, n is designated as the Config Info but m and n are adjusted on-site by the Kodak service engineer. Basically, adjustment is performed to achieve a linear output.
Kodak Imation DryView 8700+8800	-A 320 -T NO -M CUBIC –S “LUT=m, n”-m (on-site adjustment) (entered in param member) 78 (entered in pixelPitch member) 4096 (entered in W member) 5220 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Maximum density: 3.20 • S LUT = m, n is designated as the Config Info but m and n are adjusted on-site by the Kodak service engineer. Basically, adjustment is performed to achieve a linear output.

		• The Kodak service engineer is responsible for setting the smoothing type on-site since it can be changed with each printer. • The rest is done by the printer itself.
Kodak Imation DryView 8700+9440	-A 320 -T NO -M CUBIC –S "LUT=m, n"-m (on-site adjustment) (entered in param member) 78 (entered in pixelPitch member) 4096 (entered in W member) 5220 (entered in H member) The model 8800 has a rotation function but we understand that Imation has not publicly acknowledged the use of this function.	• Trimming OFF • Cubic spline interpolation • Maximum density: 3.20 • S LUT = m, n is designated as the Config Info but m and n are adjusted on-site by the Kodak service engineer. Basically, adjustment is performed to achieve a linear output. • The Kodak service engineer is responsible for setting the smoothing type on-site since it can be changed with each printer. • The rest is done by the printer itself.
Kodak Imation Dry View 8500+	-A 310 -T NO -M CUBIC -m ? -S LUT=0?, 2? (?: Site Dependent) (entered in param member) 78 (entered in pixelPitch member) 14x17 3388 (entered in W member) 4277 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing must be adjusted at the user's site. • Maximum density: 3.10 • -S • LUT = m, n is designated as the Config Info but m and n are adjusted on-site by the Kodak service engineer. Basically, adjustment is performed to achieve a linear output.
Nishimoto EL2000N	-A 320 -T NO -M CUBIC -S 15 (entered in param member) 80 (entered in pixelPitch member) 4444 (entered in portraitW member) 5296 (entered in portraitH member) 5296 (entered in landscapeW member) 4444 (entered in landscapeH member) "Prepare images using CXDI" : Yes A simple calculation yields a resolution of 4444 x 5400 for the display area of the model EL2000. However, 5376@80 μm is set in the perpendicular direction of the model EL2000 since the maximum size of the CXDI images is 2688@160 μm. In this case, a small non-image area should be output as the border in the up/down direction on the film according to the calculation. In actual fact, however, the image will protrude in some cases depending on how the transport speed and other factors have been adjusted.	• Trimming OFF • Cubic spline interpolation • Maximum density: 3.20 • "15" in Config Info is linear. • The rest is done by the printer itself. Up to 5376 pixels can be set for H.

	The specifications are as follows although they cannot be set at the present time: 14" x 14" : W=4444, H=4444 (for portraits) 11" x 14" : W=4444, H=3660 (for portraits)	
Fuji CR-DPL/LPD/FM-DPL + FN-PS551	-A 300 -T NO -M CUBIC -m MEDIUM -S –P NORMAL –B BLACK –k 2 –S ? (Site Dependent) (entered in param member) 14x17 3520 (entered in W member) 4280 (entered in H member) 14x14 3520 (entered in W member) 3490 (entered in H member) 11x14 2540 (entered in W member) 3600 (entered in H member)	• Trimming OFF • Cubic spline interpolation • SHARP, MEDIUM or SMOOTH can be selected from among the presettings as the smoothing type. An AVR of 0.8 or so is appropriate. The setting is performed for each printer on-site. • -S should be adjusted at the user's site. • LUT can be selected from among the eight presettings 1 through 8 using Config Info. The setting is performed for each printer on-site. • With -k 2, the Window Center/Level for DICOM TAG (0028,1050) and (0028, 1051) are also deleted. • Maximum density: 3.00 A density of 3.20 cannot be designated. For this reason, a non-linear LUT is required.
Konica Drypro 722 + Printlink	-A 320 -T NO -M CUBIC -m 2 -S "KC_LUT=1" –O PORTRAIT –P NORMAL –B BLACK (entered in param member) 80 (entered in pixel pitch member) 14x17 4424 (entered in W member) 5324 (entered in H member) 14x14 4424 (entered in W member) 4372 (entered in H member) 11x14 3436 (entered in W member) 4424 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing type 1: BILINEAR 2: Sharp by spline interpolation 3: Slightly weak by spline interpolation 4: Weaker by spline interpolation • Maximum density: 3.20 Maximum density 3.20 could not be achieved before.
Konica Li-62P + Printlink	-A 320 -T NO -M CUBIC -m 2 -S "KC_LUT=1" –O PORTRAIT –P NORMAL –B BLACK 80 (entered in pixel pitch member) 14x17 4268 (entered in W member) 5108 (entered in H member) 14x14 4268 (entered in W member) 4104 (entered in H member) 11x14 3204 (entered in W member) 4268 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing type 1: BILINEAR 2: Sharp by spline interpolation 3: Slightly weak by spline interpolation 4: Weaker by spline interpolation • Maximum density: 3.20 Before, maximum density 3.20 could not be achieved.

Printer Model Specifications (Reference)

Name	Specifications	Maximum equivalent area in CXDI
Kodak MLP190	80μm x 4096 x 5120	2048 x 2560 (@160 μm)
Kodak KELP2180 + Kodak Print Spooler Model 100	79 μm x 4090 x 5120 (value after passing through the print spooler) • The above settings are the size of the effective area when the image passes through the print spooler and the image is plotted up to the annotation area. In other words, these settings do not display an annotation area, instead handling it as an image area. • If the data is transferred without setting [Image creation in CXDI], the Requested Image Size setting is used in DICOM. In this case, the annotation area is automatically displayed in the 2180 printer. As a result, a maximum image area of 79 μm x 4090 x 4996 must be designated. In this case, the CXDI relies on the 2180 for image rotation (Film Orientation), but images larger than 1.7 MB cannot be rotated by the 2180. Therefore, operation without the setting for [Image creation in CXDI] cannot be performed in the 2180. (Although operation is possible by setting Requested Image Size only for using DICOM without the setting for [Image creation in CXDI], this option is not installed in the CXDI.) • Although the resolution of the printer itself is 79 μm x 4090 x 5260, this complete resolution cannot be used when the image passes through the spooler. When "_" is used in AE Title, the association is rejected. Use the Disable function for N-EVENT-REPORT to disable this setting. The FilmSize parameter can be used. The MediaType (BLUE, CLEAR) parameter is also supported. • Although the Film Orientation parameter is supported up to 1.7 MB, in actuality, DR images cannot be rotated. Like the DryView8700, the images must be rotated by the CXDI side. • When Requested Image Size is expanded, the maximum plotting size is limited (79 um x 4090 x 4996) so that the annotation area can be obtained. When a Requested Image Size expansion error occurs, the image is interpolated and printed at the suitable size. In this case, the error does not return to the CXDI side. For example, the image is printed at 310 mm even if 326 mm is designated. • If an expansion error occurs in the spooler when Multi Display Format is used, the print queue cannot be processed. • The system is in a critical state when a Failure status is indicated. A user message is displayed indicating this state, and images are no longer transferred. (Fully installed) • During the Warning status, image transfer is performed while the user message is displayed (Fully installed). • If operation is aborted due to an error, a new association could not be established when the data was resent from the CXDI. GW was reset to recover the error.	2018 x 2528(@160 μm)

	• Inserting annotations in the image can lead to problems at the hospital. In the QCW, use annotations that are outside of the image. • The designated film size is 11 x 14 inch film, and automatic selection of the magazine and printing has been confirmed. • Annotations in the image are problematic in the US and EU. Thus, although DICOM annotation was used, it was not printed. Although annotation can be transferred without any errors in DICOM, an annotation error occurred in the log when transferring from the gateway to the 2180, and printing was not performed. Data was transferred from KCR to the validation tool, and the DICOM transfer method was compared to CXDI. However, the only differences were in the image size, aspect ratio, and annotation position. • Although the annotation position is 1 in terms of conformance, it is 0 as sent from KCR. The result did not change even after the change.	
Agfa DryStar 3000	80 μm x 4256 x 5174 • In the standard Agfa system, the annotation option is selected. Therefore, the full image area will not be printed correctly unless you ask the serviceman to deselect the annotation option.	2128 x 2587 (@160 μm)
Imation DryView 8700+8800	78 μm x 4096 x 5220 Note: The 8700 printer cannot display in landscape orientation. Also, the maximum density is 3.1. If the 8800 box is not added, this printer cannot be used by the CXDI. However, it can be used starting from CXDI version 2.0. • If there is an Imager Pixel Spacing tag (0018, 2264), the imager will fail.	1996 x 2544 (@160 μm)
Fuji CR-DPL /FM-DPL + FM-PS551	100 μm x 3520 x 4280 (value after passing through the print spooler) • The above settings are the allowable area size in a configuration not using annotation. • Annotation will be supported from the next version. Annotation in currently possible in US-ASCII only. IDs are designated 1 to 6 and correspond to the top left, top center, top right, bottom left, bottom center, and bottom right, respectively. The maximum area size with annotation support is 3500 x 4170 for 35 cm x 43 cm and 2538 x 3522 for B4. • Use the Disable function for N-EVENT-REPORT to disable this setting. • A function is provided for disabling the returning of warning messages. 0107 (Attribute list error) Return/Not return 0116 (Attribute Value out of Range) Return/Not return B604 (Image has been demagnified) Return/Not return • The Film Size parameter can be used. The Media Type (BLUE, CLEAR) parameter can also be used. • The Film Orientation parameter is fully supported. • The following presets are made so that LUT has the	2200 x 2675 (@160 μm)

	DMAX = 3.2D equivalent curve required by CXDI. Gamma type #17 (SAR system) Density Shift Contrast Point 1 1.57 0.10 1.00 Point 2 2.29 0.15 1.00	

Error Return Values and Log Output for print_stuff (Reference)

Error example	Return value and log output
Success	Return value: 0x00 There is no log output in this case.
Invalid parameter	Return value: 0x00000001 CXDI description : DICOM connection error (CCRTRANS_ERR_DICOMPARAM) The log output in this case is shown below. ---------- ** -s Silent mode; do not print results of all print commands ** -v Use verbose mode for DUL and SRV facilities ** x Canon Hidden Special Mode node The host name that is running a print server port TCP/IP port number of print server file One or more files that contain preformatted images for printing ----------
The server has not started up.	Return value: 0x00180012 CXDI description : DICOM connection error (CCRTRANS_ERR_NOT_CONNECT) ---------- The log output in this case is shown below. 18-135933[d2]ERR: d0012 Attempt to connect to unknown host: test 18-135933[d2]ERR: 130012 Peer aborted Association (or never connected) 18-135933[d2]ERR: 180012 Failed to establish association ----------
After a command request was sent to the server, an error was returned in response.	Return value: 0x10 CXDI description: DICOM response error (CCRTRANS_ERR_RESP) The log output in this case is shown below. ---------- (Not determined) ----------
After a command request was sent to the server, a warning was returned in response.	Return value: 0x18 CXDI description : DICOM response warning (CCRTRANS_WRN_RESP) The transfer process was successful, but a warning was returned from the server. The log output in this case is shown below. ---------- (Not determined) ----------
The printer status has returned an error.	Return value: 0x20 CXDI description : DICOM printer status error (CCRTRANS_ERR_PRN_STATUS) The log output in this case is shown below. ---------- (Not determined) ----------

The printer status has returned a warning.	Return value: 0x28 CXDI description: DICOM printer status warning (CCRTRANS_WRN_PRN_STATUS) The transfer process was successful, but a warning was returned as the printer status. The log output in this case is shown below. ---------- (Not determined) ----------
Other errors	Return value: Values other than those above CXDI description : DICOM communications error (CCRTRANS_ERR_DICOM_TRANSE) The log output in this case depends on the specific error. A typical example is shown below. ---------- 18-140933[d2]ERR : c0082 SRV Send (DATA SET) failed in SRV_SendDataSet 18-140933[d2]ERR : 190082 SRV Request failed in SRV_NCreateRequest 18-140933[d2]ERR : 70012 NULL_key passed to routineDUL_ReleaseAssociation ----------

Precautions for connecting the server (reference)

Equipment	Restrictions on connections
Kodak Miil	Transmitting the 0019 shadow group causes a failure, and the group is not received properly with the default. Its reception is enabled by setting the strictValidation parameter to Off in Miil.
Fujitsu Dr. ABLE	• Transmission is currently performed with the "1 study multi series/1 series 1 image" setting. However, since a multi format is used for the screen displays for each series under the Dr.ABLE specifications, the switching operations are a hassle. The user will find it more convenient if it is at all possible to change the setting to "1 study 1 series/1 series multi image." (These unusual data specifications were requested with the full understanding of their unusualness.) • With DICOM, the body parts (such as the abdomen and head) and their directions (such as PA and AP) belong to the series information. It therefore follows that a different series is required for a different body part or body part direction. This aspect is restricted by the DICOM standard rather than by the installation and other steps taken by us. To put it the other way around, multiple images with different body parts and their directions cannot be put together as a series. To remedy this problem, devising a way of enabling the viewers to reference different series at the same time at some future point in time will be helpful.
Hitachi	• Transmission is currently performed with the "1 study multi series/1 series 1 image" setting. However, since a multi format is used for the screen displays for each series, the switching operations are a hassle. The user will find it more convenient if it is at all possible to change the setting to "1 study 1 series/1 series multi image." • This problem arises with the Fujitsu equipment as well. Refer to the section on Fujitsu.

send_image error return values and log output (reference)

Example of error	Return value and log output
Successful	Return value: 0x00 No log output at this time
Invalid parameter exists.	Return value: 0x00000001 CXDI interpretation: DICOM connect error (CCRTRANS_ERR_DICOMPARAM) See below for the log output at this time: ---------- -t Set called AE title to title in Association RQ -v Place DUL and SRV facilities in verbose mode node Node name for network connection port TCP / IP port number of server application image A list of one or more images to send ----------
Server fails to start.	Return value: 0x00180012 CXDI interpretation: DICOM connection error (CCRTRANS_ERR_NOT_CONNECT) See below for the log output at this time: ---------- 18-132600[127]ERR: 60012 TCP Initialization Error: Invalid argument 18-132600[127]ERR: 130012 Peer aborted Association (or never connected) 18-132600[127]ERR: 180012 Failed to establish association ----------
As a result of providing the server with a command request, an error was returned as response.	Return value: 0x10 CXDI interpretation: DICOM response error (CCRTRANS_ERR_RESP) See below for the log output at this time: ---------- (To be determined) ----------

As a result of providing the server with a command request, a warning was returned as response.	Return value: 0x18 CXDI interpretation: DICOM response warning (CCRTRANS_WRN_RESP) The transmission processing was successful but a warning was returned from the server. See below for the log output at this time: ---------- (To be determined) ----------
Other errors	Return value: other than above CXDI interpretation: DICOM communication error (CCRTRANS_ERR_DICOM_TRANSE) The log output is many and varied. It depends on the error. One example is shown below. ---------- 18-140933[d2]ERR: c0082 SRV Send (DATA SET) failed in SRV_SendDataSet 18-140933[d2]ERR: 190082 SRV Request failed in SRV_NCreateRequest 18-140933[d2]ERR: 70012 NULL key passed to routine: DUL_ReleaseAssociation ----------

Concerning the Dry View 8700 (reference)

LUT (Lookup Table)

- Image adjustment parameters that can be changed by users

  Density : This can be set up to the maximum density of 3.1D.

  Contrast : This can be set from 1 to 15.

- Image adjustment parameters that cannot be changed by users

  Lookup tables called TFTs (Transfer Function Tables) are provided internally, and changes can be made only in the service mode.

  Fifteen types of characteristic curves are registered in one of these TFTs, and users can change one of these curves as the contrast.

  Over 30 TFTs are registered in the printer, and a name is allocated to each one.

  For instance, 15 types of linear straight lines are registered in the TFT called “WRKST2A.”

  By setting this WRKST2A TFT, adjustments can be made by combining 15 types of linear straight lines (which cannot be changed by users) with 15 types of characteristic curves (which can be changed by users).

Concerning connections

Two types of the Dry View 8700 are available.

- Dry View 8700 Plus

  The 8700 Plus is a printer which can be connected to two diagnostic units. When used in combination with the 8800 multi input manager, it can be connected to up to eight diagnostic units. Images are processed as described above.

- Dry View 8700 Dual

  It is possible to connect two 8700 Dual units to the 8800 multi input manager. By using these in combination, up to seven diagnostic units can be connected. The 8700 Dual does not come with image processing functions

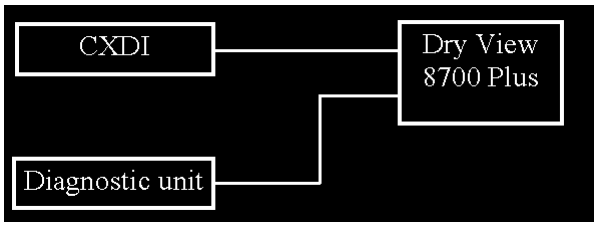
Modality connection I/F

This I/F is the external interface which connects “Dry View 8700” with each modality. Select the following item depending on the modality which would be connected.

- Digital Signal: DEIB (Digital External Interface Box)
- Video Signal: EVEIB (Enhanced Video External Interface Box)
- Keypad, Auto Filming: UKEIB (Universal Keypad External Interface Box)

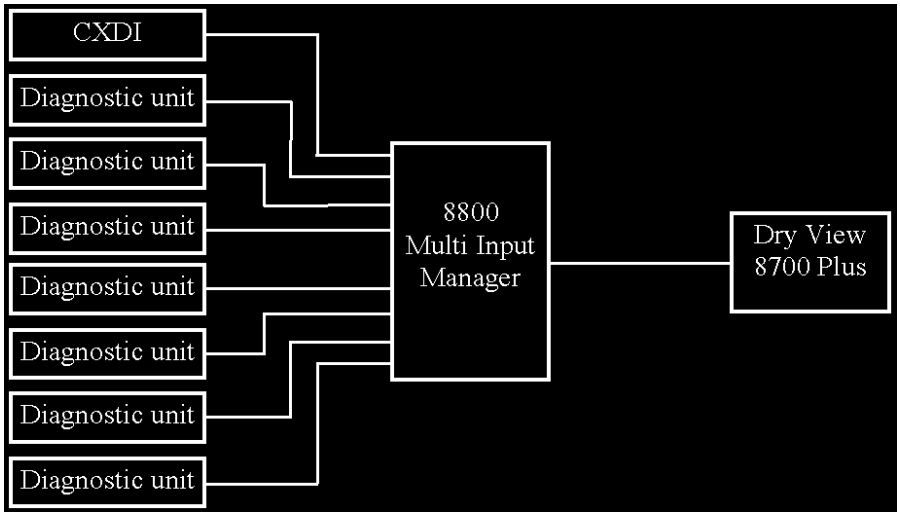
Dry View 8700 Plus

Up to 2 units can be connected.



Dry View 8700 Plus + 8800 Multi Input Manager

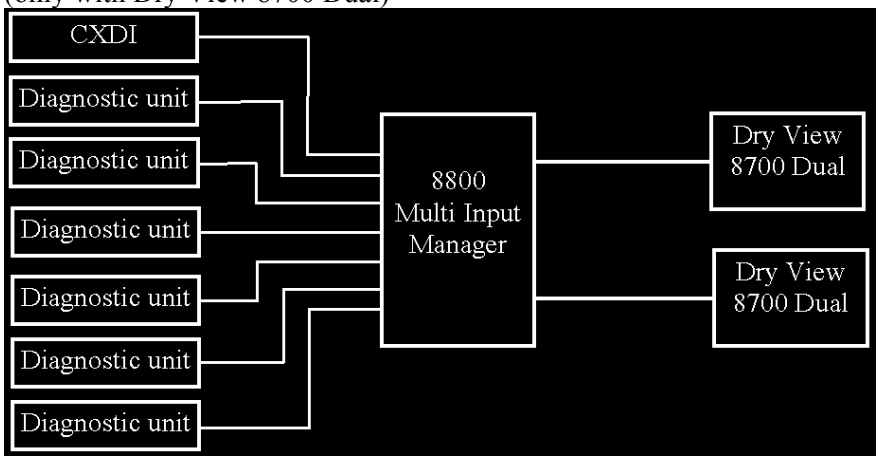
Up to 8 units can be connected.



Dry View 8700 Dual + 8800 Multi Input Manager

Up to 2 printers can be connected (only with Dry View 8700 Dual)

Up to 7 units can be connected.



(11) Linearity Check of Transfer Image Density

1) Purpose

An SMPTE image is used to check whether the density linearity of the image printed out by the printer and the image displayed on the high-definition monitor matches the density linearity of the image transferred by the CXDI.

2) Notes

2-1) This checking procedure should be performed before the procedure in the section of "Operation Unit Gamma Correction".

2-2) The adjustment and checking procedures below should be completed before performing this procedure.

A) The printer and high-definition monitor connections and setting adjustments should be completed. The printer and monitor image output settings should be set to LINEAR.

For example, if the KODAK MLP190 is connected, the printer parameter "-S configuration" must be set to "-S CS000". For other printers, refer to "Printers and Parameter Examples Reference" in "Network Connections", and set so that the curve shape is 0 (density linear).

B) Be sure to calibrate the printer and high-definition monitor units separately before performing this procedure.

C) When the imaging screen is "tray type", change it to "category type" by selecting:

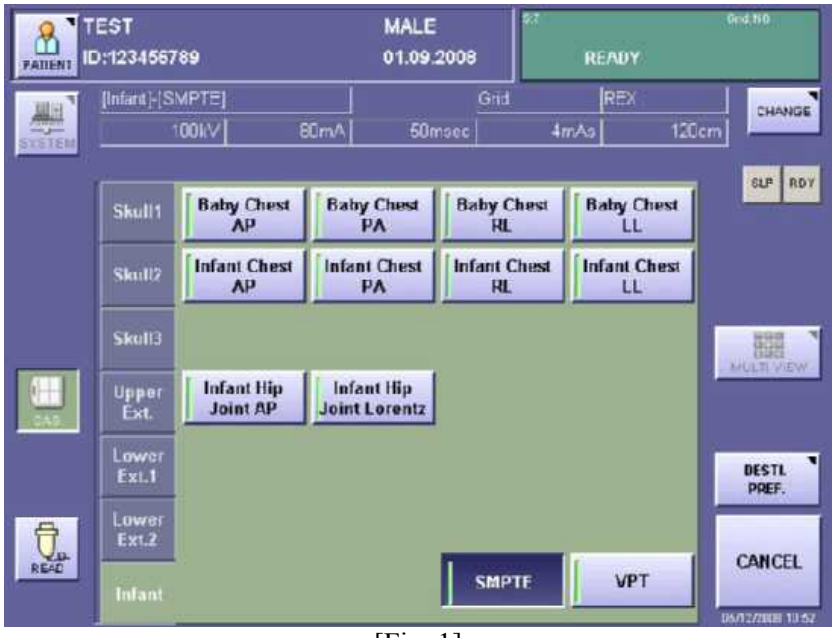
System → SETUP MENU → CUSTOMIZE DISPLAY.

3) Rough adjustment

3-1) Start up the CXDI system.

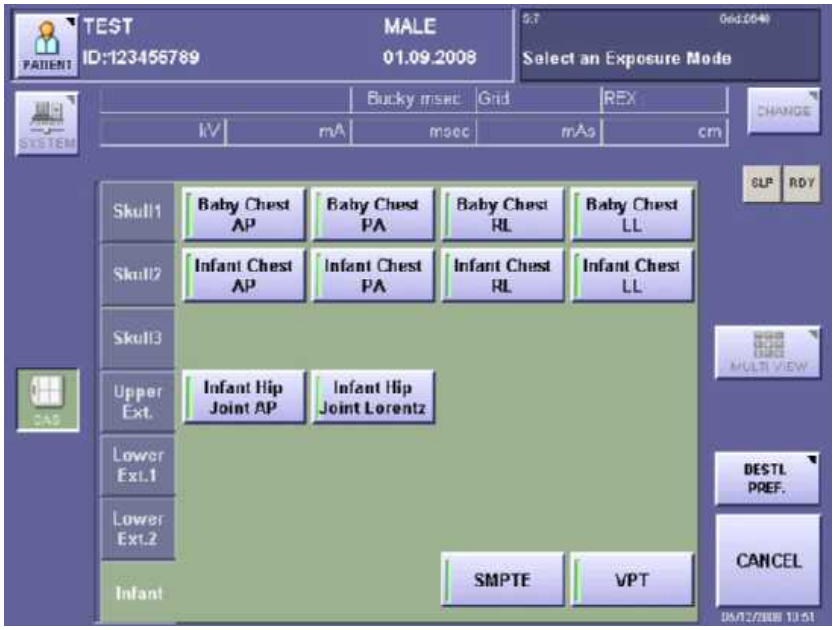
3-2) Using the two knobs at the rear of the operation unit, adjust the brightness and contrast of the touch panel screen for optimum visibility.

3-3) On the exposure screen, select the exposure mode "SMPTE" and wait until "READY" appears. [Fig. 1]



[Fig. 1]

3-4) Press the exposure switch on the X-ray generator, and after the exposure, press the END STUDY button. Transfer the SMPTE pattern image to the printer or the high-definition monitor. [Fig. 2]



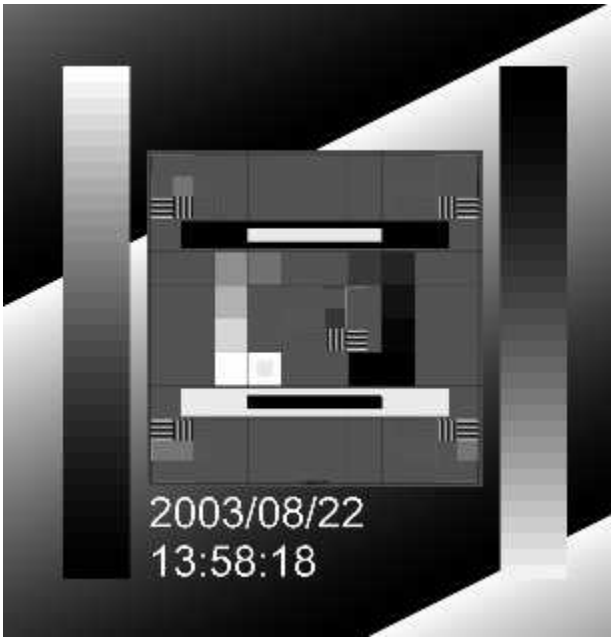
[Fig. 2]

3-5) Measure the densities of the 11 locations (0% to 100%) of test image grayscale on the film or on the monitor. [Fig. 3]

* Measure the SMPTE image density on the film is measured using a densitometer.

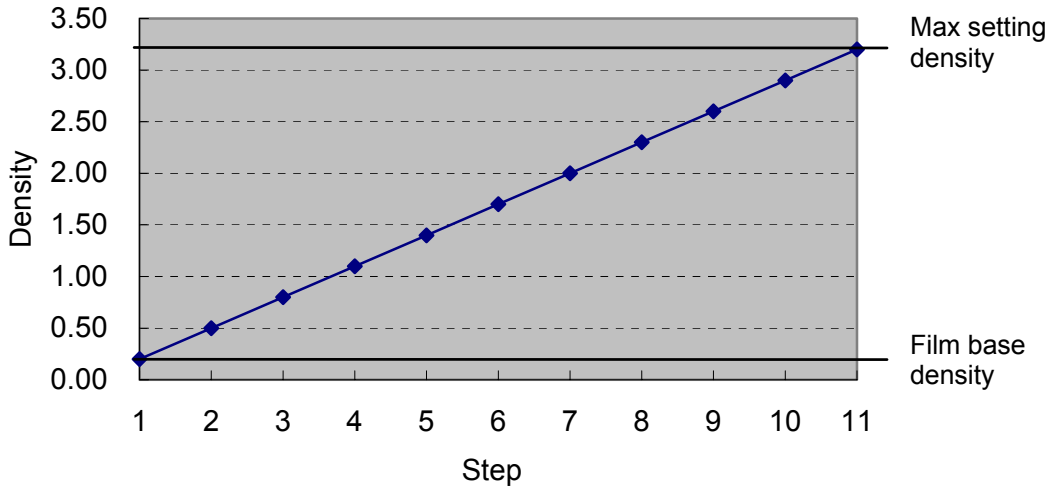
  Measure the SMPTE image density on the high-definition monitor using the gradation analysis software.

* The data for the SMPTE test image grayscale transferred by the CXDI are the values for the maximum density (3.20 in the case of the MLP 190) in the printer settings which have been changed in 11 uniform steps.



[Fig. 3]

3-6) Create the graph below based on the data measured in step 5).



As shown in the above graph, the measurement values need only to nearly form a straight line from the minimum density to the maximum density.

The important point here is that the measurement values make a straight line and a maximum density corresponding to the settings is output.

If the measurement values deviate too far from the straight line and a maximum density corresponding to the settings is not output, printer and monitor output linearity settings, calibration, and other adjustments are necessary.

* The above graph is an example of measurements when the maximum density is set to 3.2 D and the printed film is measured with a densitometer. Refer to the data below when the maximum density is set to 3.1 D, or when gradation analysis software is used to take measurements on the monitor.

* The LINEAR output cannot be set for some printer models.

  In this case, try to select an output setting as close as possible to LINEAR.

Ideal density values in LINEAR LINE

Step	1	2	3	4	5	6	7	8	9	10	11
3.2 D	0	0.32	0.64	0.96	1.28	1.60	1.92	2.24	2.56	2.88	3.20
3.1 D	0	0.31	0.62	0.93	1.24	1.55	1.86	2.17	2.48	2.79	3.10
12 Bit	0	410	819	1229	1638	2048	2457	2867	3276	3686	4095
8 Bit	0	26	51	77	102	128	153	179	204	230	255

Possible causes of non-linearity in measurement values:

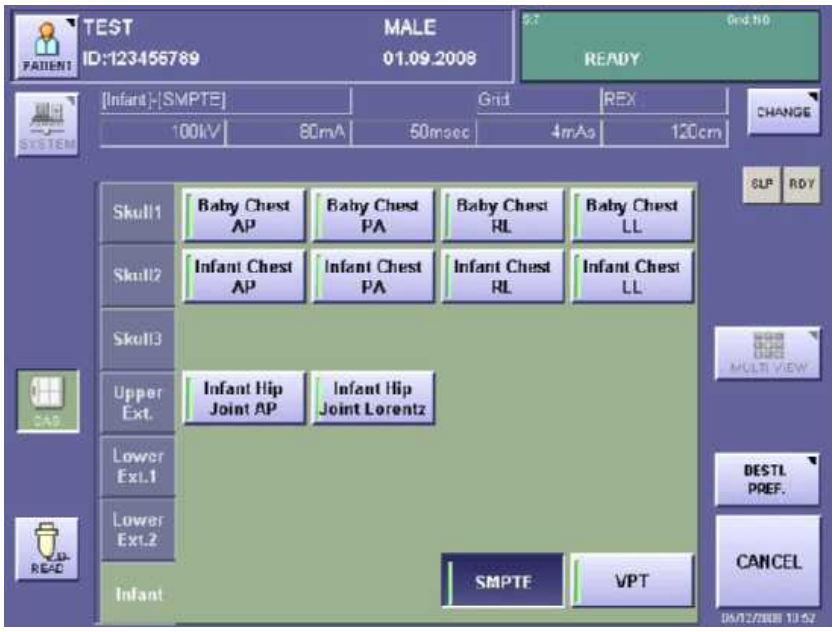
* Inadequate calibration of printer and high-definition monitor

* Inadequate settings for CXDI printer parameters

* Faults in printer or high-definition monitor

4) Fine adjustment

4-1) As the step (3)-3) above, make the system “READY” by selecting the exposure mode “SMPTE” on the exposure screen. [Fig. 4]

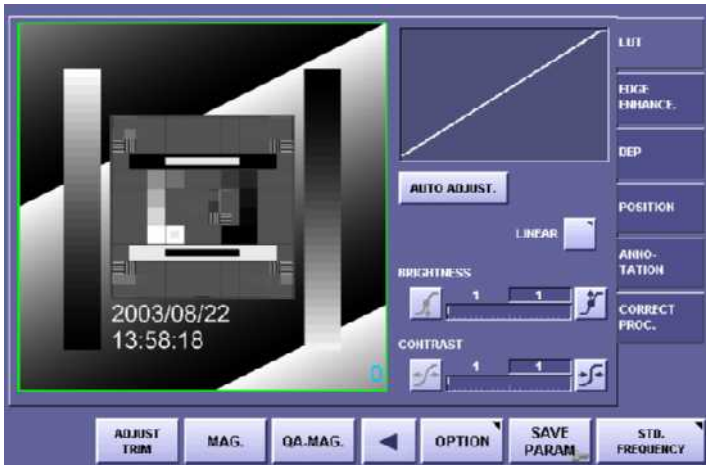


[Fig. 4]

4-2) On the X-ray generator press the exposure button. After the exposure, adjust the trim so that the gray scale may be located in the center of the image. [Fig. 5]

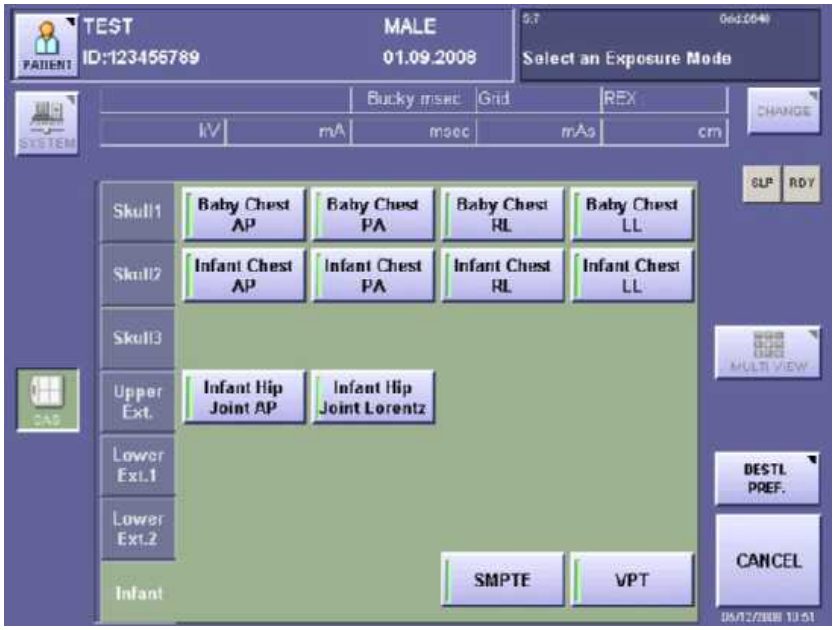
* For correct density measurement of the 32-step chart, the gray scale must be printed in the center of an image to eliminate the shading feature.

* Data may not from a straight line near the minimum and maximum densities due to characteristics of the printer. Rotate the image on the QA screen, and reprint or retake measurements.



[Fig. 5]

4-3) Select the END STUDY and transfer the SMPTE pattern image to the printer or the high-definition monitor. [Fig. 6]

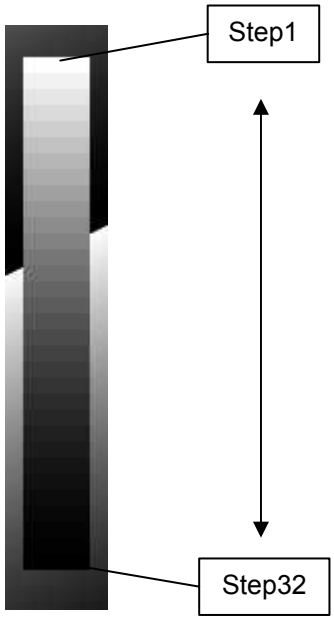


[Fig. 6]

4-4) On a printed film or on the monitor, measure the density of 32 steps of the grayscale on the test image. [Fig. 7]

*1: Measure the SMPTE image density on the film using a densitometer. The SMPTE image density on the high-definition monitor is measured using the gradation analysis software.

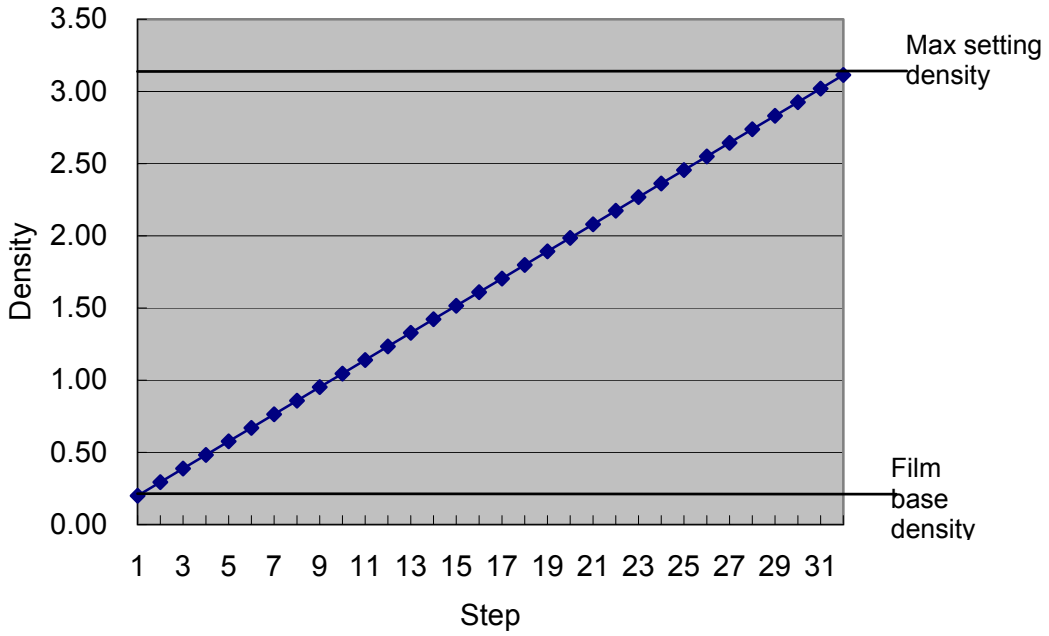
*2: The data for the SMPTE test image grayscale transferred by the CXDI are the values for the maximum density (3.20 in the case of the MLP 190) in the printer settings which have been changed into 32 uniform steps.



[Fig. 7]

4-5) As the step (3)-6), create a graph based on the data measured in step 4), and make sure that the data from the minimum density to the maximum density nearly form a straight line.

Characteristics of the printer may prevent the data from forming a straight line near the minimum and maximum densities. Rotate the image on the QA screen, and reprint or retake measurements.



Ideal Density Data for Linear Line

Step	1	2	3	4	5	6	7	8	9	10	11
3.2 D	0	0.10	0.21	0.31	0.41	0.52	0.62	0.72	0.83	0.93	1.03
3.1 D	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
12 Bit	0	132	264	396	528	660	792	924	1056	1188	1320
8 Bit	0	8	16	24	32	41	49	57	65	74	82

Step	12	13	14	15	16	17	18	19	20	21	22
3.2 D	1.14	1.24	1.34	1.45	1.55	1.65	1.75	1.86	1.96	2.06	2.17
3.1 D	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00	2.10
12 Bit	1453	1585	1717	1849	1981	2113	2245	2377	2509	2641	2774
8 Bit	90	98	106	114	122	131	139	147	155	164	172

Step	23	24	25	26	27	28	29	30	31	32
3.2 D	2.27	2.37	2.48	2.58	2.68	2.79	2.89	2.99	3.10	3.20
3.1 D	2.20	2.30	2.40	2.50	2.60	2.70	2.80	2.90	3.00	3.10
12 Bit	2906	3038	3170	3302	3434	3566	3698	3830	3962	4095
8 Bit	180	188	196	205	213	221	229	238	246	255

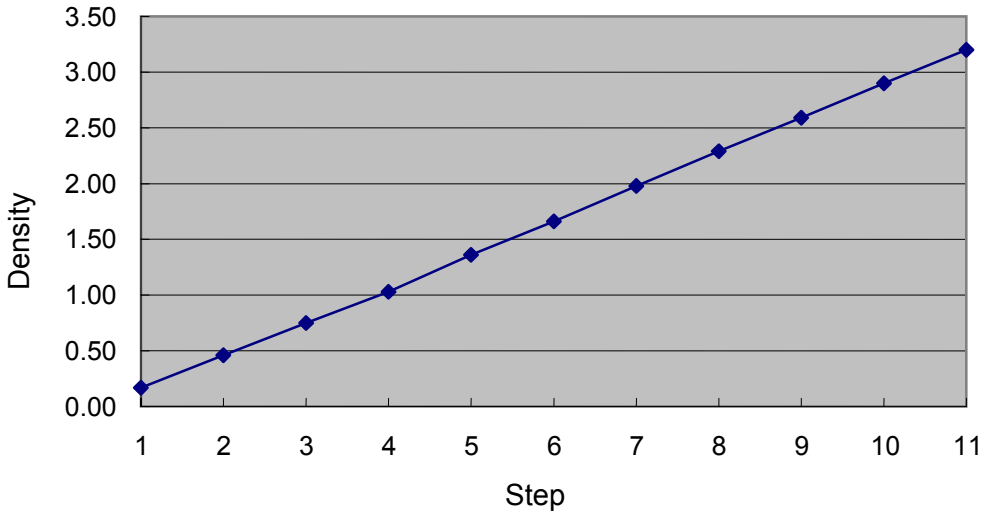
<**Reference 1**>

In the data and graph below, the data was obtained by setting the Kodak MLP 190 to curve shape 0 (density linear), a maximum density of 3.20, the SMPTE test image was printed out, and the image data was measured.

As shown in the graph, the data from the minimum density (film base density) to the maximum density nearly form a straight line.

SMPTE Density

Step	1	2	3	4	5	6	7	8	9	10	11
Percentage	0	10	20	30	40	50	60	70	80	90	100
Density (D)	0.17	0.46	0.75	1.03	1.36	1.66	1.98	2.29	2.59	2.90	3.20



* The printer parameter settings in this case are:

-A 320 -T NO -M CUBIC -m NORMAL -S CS000

<**Reference 2**>

Example when the graph does not form a straight line

In the data and graph below, the data was obtained by using the Kodak MLP 190 to print out the SMPTE test image, and the image data was measured.

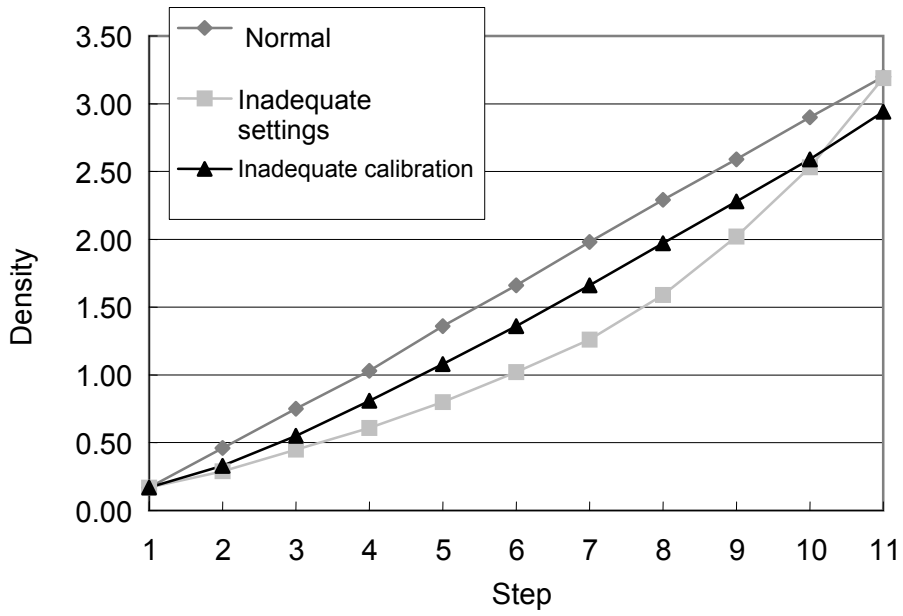
(1): Shows normal data.

(2): Shows the case when the CXDI printer parameters are not set linearly.

(3): Shows the case when the printer was not calibrated properly.

SMPTE Density

Step	1	2	3	4	5	6	7	8	9	10	11
Percentage	0	10	20	30	40	50	60	70	80	90	100
(1) Normal	0.17	0.46	0.75	1.03	1.36	1.66	1.98	2.29	2.59	2.90	3.20
(2) Inadequate parameter settings	0.17	0.29	0.45	0.61	0.80	1.02	1.26	1.59	2.02	2.53	3.19
(3) Inadequate calibration	0.17	0.33	0.55	0.81	1.08	1.36	1.66	1.97	2.28	2.59	2.94



* For improper parameters, the printer parameter "-S CS000" was not entered.

* For the inadequate calibration, the printer calibration data was set too low.

(12) Operation Unit Gamma Correction

1) Purpose

This procedure is performed so that the image that is printed out or displayed on a high-definition monitor conforms exactly to the exposure image on the operation unit.

2) Notes

2-1) The procedure in “Linearity Check of Transfer Image Density” must be completed.

2-2) If image adjustment for the printer or high-definition monitor has not been made, use the “Gamma Correction Calculation Tool” in order to correct the gamma of high definition monitor image to be a same as printer image.

2-3) Gamma correction is an image correction process for monitors and film. It is different from the contrast setting or grayscale setting.

This procedure is simply a visual adjustment. As a result, differences may occur depending on the operator performing the procedure. Therefore, be sure to consult with the responsible technician before performing this adjustment.

2-4) To make the gamma of operation unit adjust in detail, use the “Gamma Correction Calculation Tool”.

3) Preparation

The Option button used in gamma correction is normally hidden. Edit the MenuPara.ini file to display.

3-1) Open MenuPara.ini file.

3-2) Make the following changes, and overwrite the file.

Use Search in Edit to find OptionDlgBth.

Select Customize.

OptionDlgBtn = 0 ← Change to 1.

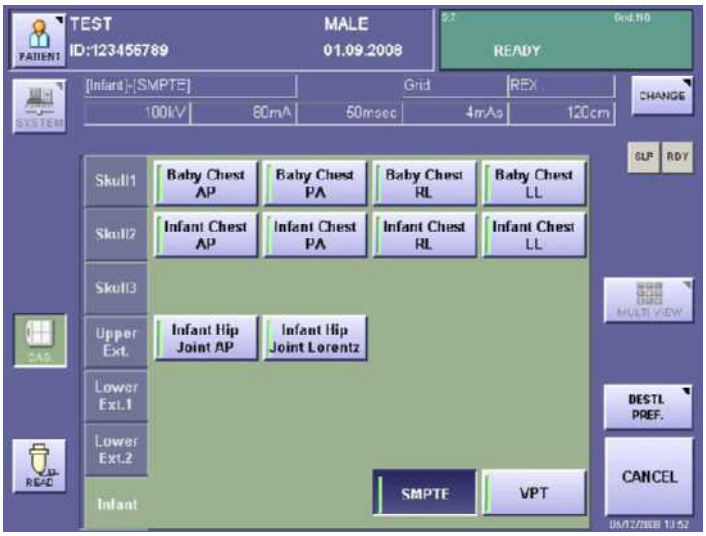
(0: Don’t display; 1: Display)

4) Comparison of Operation Unit Image and Print Image or Monitor Image.

4-1) Start up the CXDI system.

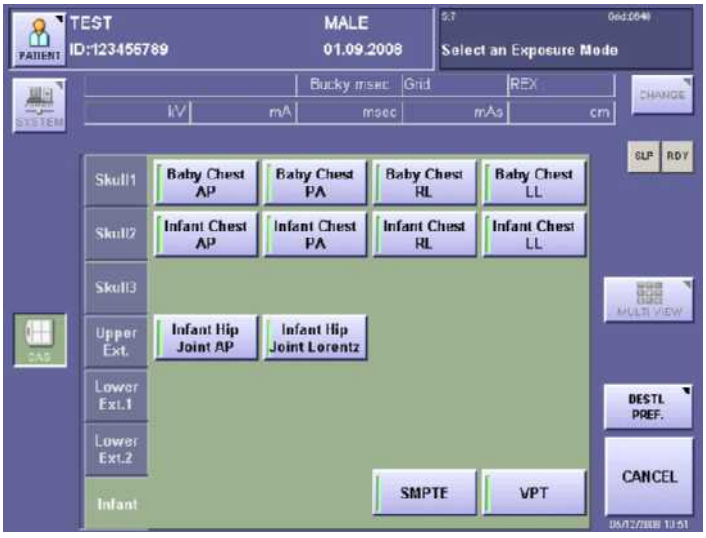
4-2) Use the two adjustment knobs at the rear of the operation unit to adjust the brightness and contrast of the touch panel screen for optimum visibility.

4-3) On the exposure screen, select the exposure mode “SMPTE” and wait until “READY” appears. [Fig. 1].



[Fig. 1]

4-4) On the X-ray generator, press the exposure button, and after the exposure, select “END STUDY”. Transfer the SMPTE pattern image to the printer or the high-definition monitor. [Fig. 2]



[Fig. 2]

4-5) Take the SMPTE pattern image again. On the QA screen, compare the image displayed on the operation unit screen with the film image printed in Step 4) above or with the image on the high-definition monitor. Make sure there is no difference in contrast and gradation between those images. Check both preview and magnify images.

If there are any differences between these images, perform the procedure described in “(4) Operation Unit Image Gamma Correction” on the next page.

If there are no differences between these images, the steps are complete.

5) Operation Unit Image Gamma Correction

5-1) On the QA screen displayed on Step (4) 5) above, select the “Option” tab and the “Gamma Adjustment” button is appeared, and then press this button. [Fig. 3]

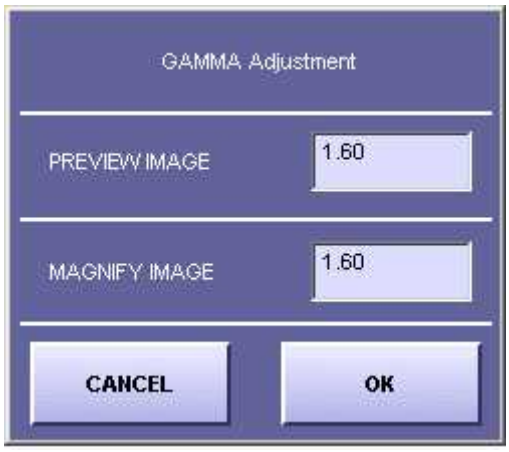
[Fig. 3]

5-2) The “Gamma Adjustment’ window appears. Change the value for the PREVIEW IMAGE, and press OK. The gamma correction for the operation unit screen is performed. [Fig. 4]

(Make sure the gamma value for the test image has changed on the operation unit screen.)

The gamma value is adjustable from 1.00 to 2.50.

When the image on the operation unit is lighter (whiter) than the film image, increase the value. On the contrary, if the image on the operation unit is darker (blacker) than the film image, decrease the value. The default gamma value is 1.60.



[Fig. 4]

5-3) When the gamma value for the preview image is adjusted, then adjust the gamma value for the magnify image. The default gamma value for the magnify image is 1.60.

5-4) The correction steps are complete.

(13) Changing the Total Image Count

1) Purpose

When the imaging unit is replaced (including the replacement of the LANMIT) for servicing, the total image count displayed on the user screen can be returned to “0”if necessary.

2) Notes

2-1) The CXDI is connected by the system.

2-2) Set the CXDI software so that it does not start up.

2-3) Files are overwritten, and so be careful when performing the procedure.

2-4) As an extra precaution, write down the numerical values before overwriting them.

2-5) The overwritten counter becomes valid the next time that the CXDI software is started up.

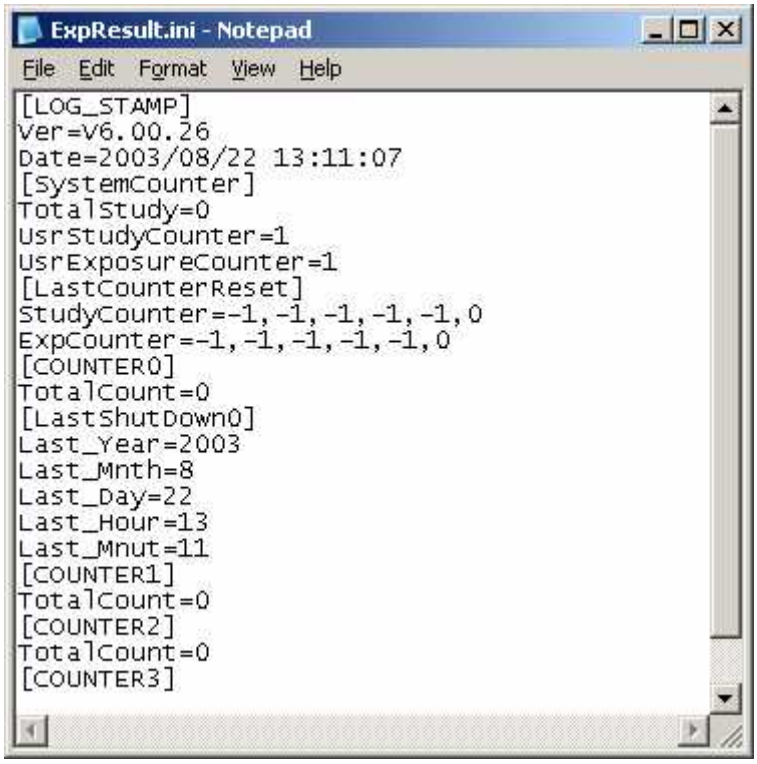
3) Procedure

3-1) Turn on the control computer, and then start up Windows XP.

3-2) Right click on My Computer on the Desktop screen of Windows XP, and open Explorer.

3-3) A file called “ExpResult.ini” is contained in the CCR folder.

Open this file. (D:\CCR\ExpResult.ini) [Fig 1]



[Fig 1]

3-4) Changing the items below contained in the file allows you to change the settings for the counter in the user screen.

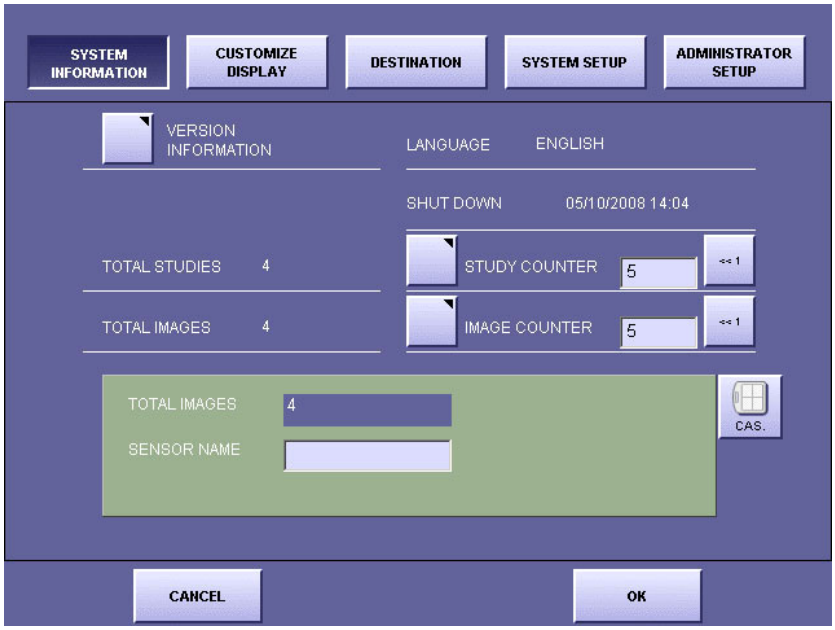
ExpResult.ini file	Screen Display	Note
[SystemCounter]		
TotalStudy=	TOTAL STUDIES	
UsrStudyCounter=	STUDY COUNTER	Can be overwritten at the user screen
UsrExposure Counter=	IMAGE COUNTER	Can be overwritten at the user screen
[LastCounterReset]		
StudyCounter=	Year, month, day, hour, minute	
ExpCounter=	Year, month, day, hour, minute	
[COUNTER 0]		
TotalCount=	Total number of images obtained with imaging unit 1.	
[COUNTER1]		
TotalCount=	Total number of images obtained with imaging unit 2.	
[COUNTER2]		
TotalCount=	Total number of images obtained with imaging unit 3.	
[COUNTER3]		
TotalCount=	Total number of images obtained with imaging unit 4.	

3-5) After overwriting the values, overwrite the file “ExpResult.ini” and save.

3-6) Close all windows that are open on the Desktop, and then start up the CXDI software.

3-7) Open the “System Information” screen, and check that the changed items have been set correctly. [Fig 2]

“TOTAL IMAGES” indicates the total number of images obtained with all imaging units automatically.



[Fig 2]

(14) Backing Up When Installing

1) Purpose

In case of re-installing the CXDI software, the necessary files for the exposure position and other parameters must be backed up so that can be restored at the status of first installation.

2) Necessary items

2-1) Removable drive such as MO drive or external HDD that can connect to USB 2.0

3) Notes

3-1) Before performing backup procedure, delete any “BodyPart” and image data exposed for tests.

Deleting image data: Refer to the “Deleting Data” item.

Deleting “BodyPart”: Refer to the CXDI Series Operation Manual.

3-2) Backup should be performed immediately before handing over the product to the customer only for new installations.

4) Connections

4-1) Check that all equipment is turned off.

4-2) Connect the keyboard and mouse removal drive to the control computer.

5) Settings

5-1) Turn on the operation unit power and then the control computer power.

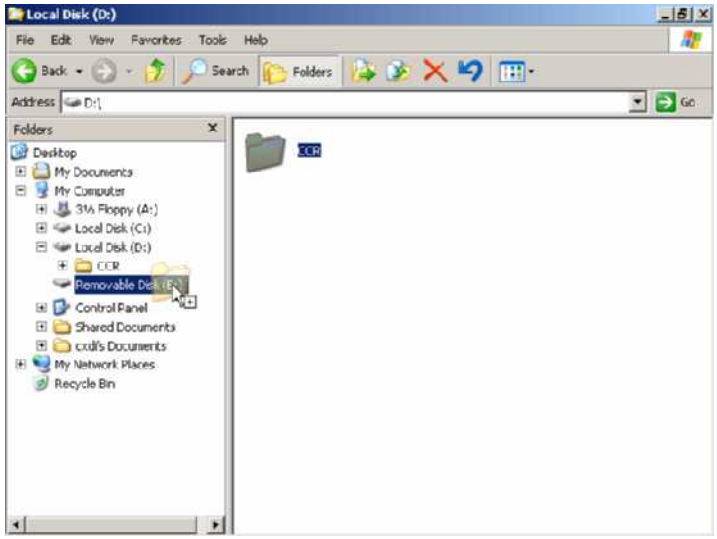
5-2) The CXDI software starts. Press the [Alt] + [Tab] keys to switch the program to the Command Prompt screen.

5-3) The message “Welcome to Canon CXDI” appears. Input [8] and press the [Enter] key. (Select “8 Exit”.)

5-4) The Windows XP desktop screen appears.

5-5) Right click on My Computer on the Desktop screen, and select Explorer from Menu.

5-6) Explorer appears. Copy the CCR folder onto Removable Drive.



(15) Backing up Setting Data to FD

1) Purpose

"Important setting data (setting information which differs for each customer.)" is backed up to floppy disks and hard disks in consideration of possible setting data loss, hard disk corruption or other data errors.

In the event that setting data is lost or the hard disk is corrupted, this "Important setting data" can be quickly restored to the condition before the trouble occurred by copying from the backup data.

2) Notes

2-1) Performing this backup work means that the CXDI system will be used with the floppy disk inserted in the floppy disk drive.
Be sure to eject the floppy disk from floppy disk drive in order to avoid damaging it, in case of changing the layout or moving the control computer.
Likewise, when mounting the system in a vehicle, vibrations may cause damage to the floppy disk drive.
Therefore, after backing up the latest data to the floppy disk, be sure to eject the floppy disk.

2-2) Based on the reason in note 1) above, do not perform backups in an environment that is exposed to vibrations. Therefore, never perform backups when the control computer is loaded in a car.
In V4.0 and later versions, the default FD-Buck Up setting is ON. When backup to a floppy disk is not allowed, set it to OFF.

2-3) In the product default settings, [Boot Priority Order] [1:] is set for the HDD model number in the system BIOS settings. However, as a precaution, check that Boot Priority Order] [1:] is actually set for the HDD model number. If the setting is changed to "Legacy Floppy Drives", the control PC may not start properly when a floppy disk is inserted.

2-4) Be sure to always format the floppy disk that you are using before performing backups.

2-5) The backup procedure described here covers the case when backing up for the first time after installation. For the second and subsequent times, data is automatically backed up to the floppy disk whenever the user changes the exposure mode buttons or other settings.

2-6) This backup procedure cannot be performed with just the control computer. Connect the imaging units and other equipment, and start up in the normal exposure status.

3) Procedure

3-1) Insert a formatted floppy disk (1.44 MB) in the control PC's floppy disk drive.

* Make sure the write protect of the floppy disk is unlocked at this time.

3-2) Start the CXDI software. If you have changed the parameters including the exposure mode button, back up all "ini.files" to a floppy disk when you restart the system again.

* When you first back up the files, the back up operation may take some time because there are many files to be copied.

3-3) Make sure that all files have been copied and switch off the CXDI system.

* The files copied to a floppy disk are the "C:\ccrbup", and they are the latest backup data. If the data stored in the drive D is damaged and there is no trouble in the drive C, restore the CXDI setting data using the data in "C:\ccrbup".

4) FD-Back Up Off

If FD-Back Up is not necessary, open the “Service tool” window, select “FD-Back Up Off” and press “Start”.

System > Set Up menu > Administrator Setup> Service Tool.

(16) Tool Modes (/np mode)

1) Purpose

The tool modes (startup options) are intended in order to check operation, and are used to launch the CXDI software on the control computer by itself, and to display items that are not normally displayed.

2) Notes

The following operation must be performed before using the "/np" mode. Especially, be sure to back up the exposure mode names and the customized settings before the operation.

2-1) When using "/np" with the same settings as that of the connected imaging unit

"BodyPart**.ini" file can be used as it is.

Example:

	Connection	/np setting
Sensor1	Table	Table
Sensor2	Stand	Stand

2-2) In case of using "/np" with different settings from that of the connected imaging unit
Move the "BodyPart**.ini" file in the "BodyParts" folder to the desktop, etc. However, do not move the Reference folder. If the "BodyPart**.ini" file is left in the "BodyParts" folder, system will not be able to be started, as the sensor type of the "BodyPart" and the settings do not match.
Example:

	Connection	/np setting
Sensor1	Table	Table
Sensor2	Stand	Stand

3) Preparation

3-1) Connect the keyboard and the mouse to the control computer.

3-2) Delete the "ccrstart.bat" file from startup.

3-3) Disconnect the imaging unit from the control computer.

4) Startup Method

4-1) Start up Windows XP.

4-2) Start the Command Prompt screen.

Start ⇒ Program ⇒ Accessories ⇒ Command Prompt

4-3) Command Prompt screen appears, type the commands following instruction below to start the CXDI software. (Press the [Enter] key after typing the command.)

No.	Command Prompt	Command	Note.
1	C:\>	D:	
2	D:\>	cd ccr	"Space" delimiter is required between "cd" and "ccr".
3	D:\ccr>	ccrxxxxx /np	"Space" delimiter is required between "xxxxx" and "/". "xxxxx" is different in version.

4-4) If the message "Sensor not connected" appears at starting of the CXDI application, click [OK] button, Change to the "Debugging mode" with the keys ([Alt] + [Tab]) using.

4-5) When Welcome to CCR appears, select "1. Set-Up...".
4-6) When Setting Mode (0: Normal, 1: Expert) [0=0x0]: appears, select "0: Normal."
4-7) When CCR SETUP MENU appears, select "7 Scan Sensor Setup".
4-8) When Capture Device Configuration Table appears, enter the number of sensor to which make the "Max Capture Device" recognized.
4-9) The dummies of "A/D Board Serial Number" are appeared: Enter the sensor serial number for necessary type.

------A/D Board Serial Number 0-0 -> 50G : 0x199
------A/D Board Serial Number 0-1 -> 12 : 0x2009
------A/D Board Serial Number 0-2 -> 31 : 0x3002
------A/D Board Serial Number 0-3 -> 40G : 0x123

For example, when CXDI-50G is connected to Sensor 1, and CXDI-31 is connected to Sensor 2:

Enter "**199**" for "A/D Board Serial Number for Sensor ID#1"
Enter "**0**" for "Custom Type".
Enter "**3002**" for "A/D Board Serial Number for Sensor ID#2"
Enter "**6**" for "Custom Type".

The CXDI software can now be launched on the control computer with the same conditions in effect as if an imaging unit were connected.

@@@@@@@@ Capture Device Configuration Table @@@@@@@@
Max Capture Devices [4 = 0x4] : 4 **←Number of imaging units connected**
@@@@@@@@ Capture Device Configuration No.0 (SensorID#1 OPU)@@@@@@@@
------A/D Board Serial Number 0-0 -> 50G : 0x199
------A/D Board Serial Number 0-1 -> 12 : 0x2009
------A/D Board Serial Number 0-2 -> 31 : 0x123
------A/D Board Serial Number 0-3 -> 40G : 0x123

Dummy Serial No. for Sensor 1

A/D Board Serial Number for SensorID#1 [0x199 = 409] : _____
Custom Type[0:NO CUSTOM 1:STAND 2:TABLE 3:UNIV 4:CASSETTE 100um 5:CASSETTE 14X17_160um 6:CASSETTE 9X11_160um] [0 = 0x0] : 0
Field of View Rotation (0:No 1:Yes) [0= 0x0] : 0
Constant for Exposure Index [0.000000] : 0.000000
@@@@@@@@ Capture Device Configuration No.1 (SensorID#2 OPU)@@@@@@@@
------A/D Board Serial Number 0-0 -> 50G : 0x199
------A/D Board Serial Number 0-1 -> 12 : 0x2009
------A/D Board Serial Number 0-2 -> 31 : 0x3002
------A/D Board Serial Number 0-3 -> 40G : 0x123

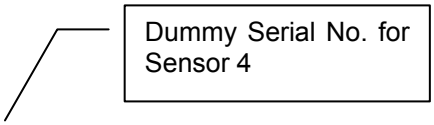
Dummy Serial No. for Sensor 2

A/D Board Serial Number for SensorID#2 [0x2009 = 8201] _____
Custom Type[0:NO CUSTOM 1:STAND 2:TABLE 3:UNIV 4:CASSETTE 100um 5:CASSETTE 14X17_160um 6:CASSETTE 9X11_160um] [0 = 0x0] : 0
Field of View Rotation (0:No 1:Yes) [0= 0x0] : 0
Constant for Exposure Index [-1.000000] : -1.000000
@@@@@@@@ Capture Device Configuration No.2 (SensorID#3 OPU)@@@@@@@@
------A/D Board Serial Number 0-0 -> 50G : 0x199
------A/D Board Serial Number 0-1 -> 12 : 0x2009
------A/D Board Serial Number 0-2 -> 31 : 0x3002
------A/D Board Serial Number 0-3 -> 40G : 0x123

Dummy Serial No. for Sensor 3

A/D Board Serial Number for SensorID#3 [0x3002 = 12290] _____
Custom Type[0:NO CUSTOM 1:STAND 2:TABLE 3:UNIV 4:CASSETTE 100um 5:CASSETTE 14X17_160um 6:CASSETTE 9X11_160um] [0 = 0x0] : 0
Field of View Rotation (0:No 1:Yes) [0= 0x0] : 0
Constant for Exposure Index [-1.000000] : -1.000000

@@@@@@@@ Capture Device Configuration No.3 (SensorID#4 OPU)@@@@@@@@@
------A/D Board Serial Number 0-0 -> 50G : 0x199
------A/D Board Serial Number 0-1 -> 12 : 0x2009
------A/D Board Serial Number 0-2 -> 31 : 0x3002
------A/D Board Serial Number 0-3 -> 40G : 0x123



A/D Board Serial Number for SensorID#4 [0x123 = 291]]
Custom Type[0:NO CUSTOM 1:STAND 2:TABLE 3:UNIV 4:CASSETTE 100um 5:CASSETTE 14X17_160um 6:CASSETTE 9X11_160um] [0 = 0x0] : 0
Field of View Rotation (0:No 1:Yes) [0= 0x0] : 0
Constant for Exposure Index [-1.000000] : -1.000000
------Need to re-start program to validate this change.

4-10) When CCR SETUP MENU appears, press the [Esc] key to return to Welcome to CCR.

4-11) Select the command "8 - Exit" in the "Welcome to CCR" menu to exit the CXDI software.

4-12) After exit the CXDI software and Windows XP desktop appears, starts the command prompt screen (Start ⇒ Program ⇒ Command Prompt). And type the command "ccrxxxxx /np" to start the CXDI software again.

a. When the CXDI software is starting up, the message "There is no BodyPart for SensorID#*. ** TYPE BodyPart will be created" appears. Click [OK]. (* differs according to the type of the imaging unit.)

→ The above message appears when a /np mode is used with a setting different to that of the connected imaging unit.

b. The messages "Conflicting X-ray parameters. Do you wish to reset parameters?" and "Conflicting X-ray tube parameters for each imaging method. Do you wish to reset parameters" appear. Click [OK] for each.

→ These above messages might be appeared if /np mode is used with a different setting.

5) Going out of /np mode

Connect the imaging unit to the control computer.

Before using the system in normal condition, perform the following steps:

5-1) If /np mode has been used with a different setting as that of the connected imaging unit, as mentioned in "(3) Notes", delete the BodyPart**.ini file made in the BodyParts folder, and return the BodyPart**.ini file which has been moved into the BodyParts folder.

5-2) Enter the command "ccrstart.bat" on command prompt to boot the CXDI application.

Follow the procedure from 3) to 9) in previous section. And check these one will be preformed properly without any problems.

5-3) Register the ccrstart.bat file to the StartUp.

7.7 Image Quality

(1) Purpose

This procedure is used to check the final image quality of the CXDI.

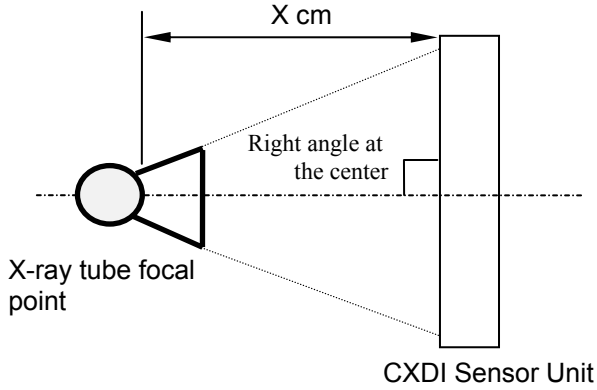
1) Resolution check

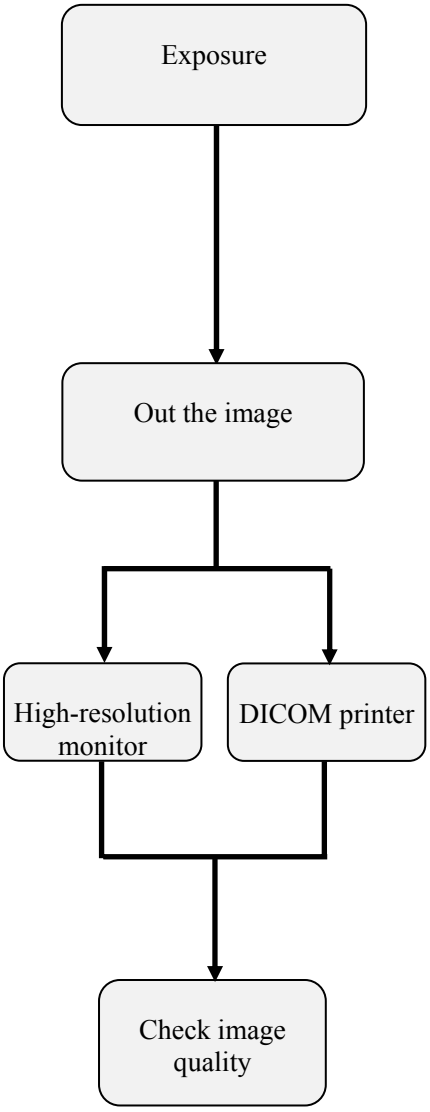
Tools used

(1) Phantom

(2) High-resolution monitor or DICOM printer

Procedure

Procedure/Item	Operation/Conditions
[Positioning] Position the X-ray tube and CXDI Imaging Unit	1. Adjust the distance between the focal point of the X-ray tube and the CXDI imaging unit. X cm: Differs according to the grid being used. 
Calibration	2. Perform calibration SYSTEM > CALIBRATION
Self-test	3. Perform self-test. SYSTEM > SELF TEST Must pass all the tests.

Procedure/Item	Operation/Conditions
	4. Irradiate X-ray and capture the image of a phantom. 5. Output the image to a high-resolution monitor or DICOM printer. 6. Set the high-resolution monitor and DICOM printer by referring to their instruction manuals. 7. Check that there is no artifacts, shading, grid stripes, etc. on the image.

7.8 Post-installation Checks

Check sheet

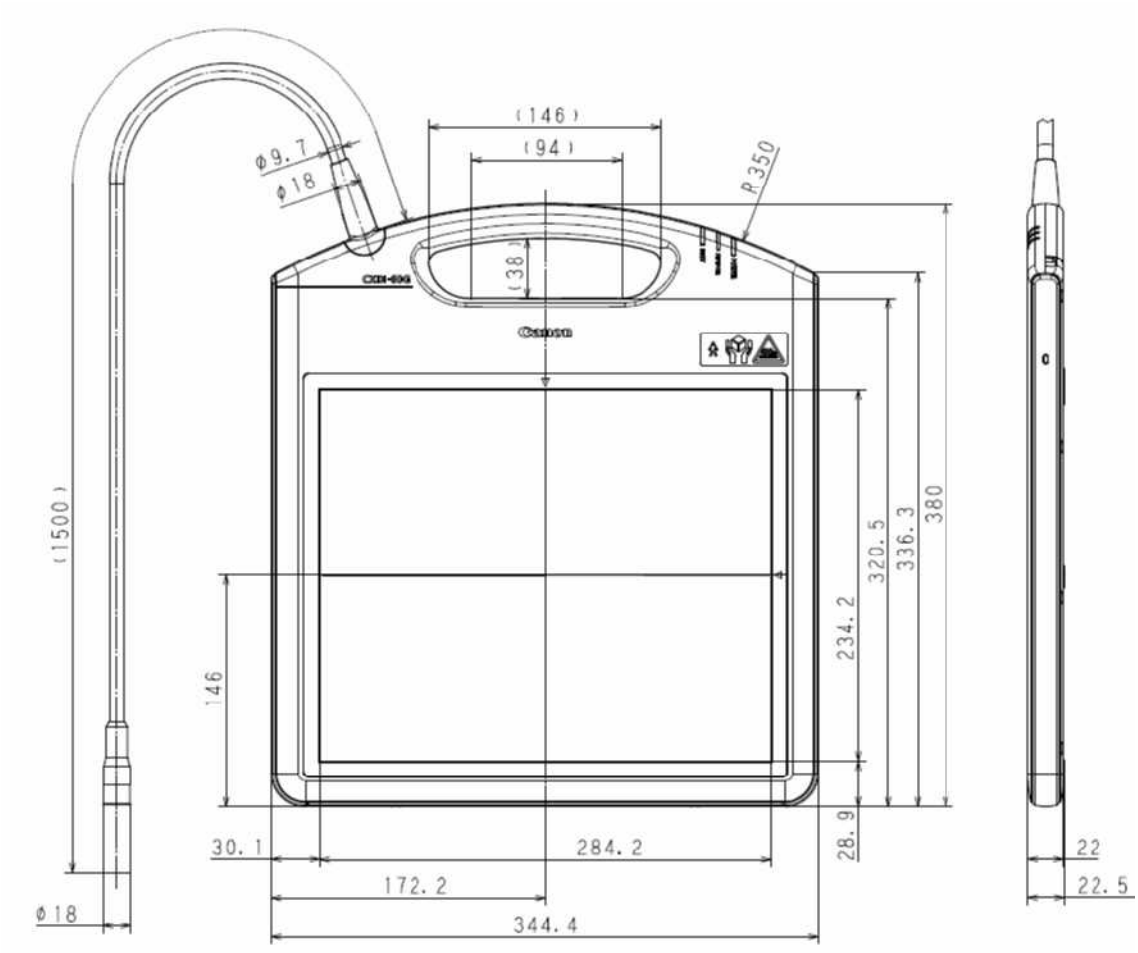
Checkpoint	Checkpoint details	Check
Checking the imaging unit	Align the unit with the X-ray tube	☐
	Check that the unit does not interfere with the cables.	☐
Checking the date and time	Set the date.	☐
	Set the time.	☐
	Set the time zone.	☐
Checking the software version	Check that the CXDI software, firmware and PLD code versions all match.	☐
Identifying and registering the imaging units	Register the serial numbers of the sensors	☐
Inputting the control computer serial number	Input the serial number of the control computer to be used.	☐
Checking the operation unit	Set the contrast.	☐
	Set the brightness.	☐
	Set the gamma correction.	☐
Checking the exposure condition table	kV	☐
	mA	☐
	msec or mAs	☐
Checking the annotation	Check that the setting have been made in accordance with the customer's request.	☐
Network connections	IP address	☐
	Subnet mask	☐
	Default gateway	☐
Preparations prior to exposure	Perform calibration.	☐
	Perform self-test.	☐
Checking image transfer to printers and storages	Check that the setting have been made in accordance with the customer's request.	☐
Checking image transfer to external memory device	Check that the image is transferred properly.	☐
Checking the image quality	Use SMPTE pattern to check the density on a linear chart. Check that there is no artifacts, shading, etc.	☐
Deleting unnecessary data (there must be no unnecessary data such as the images used for testing)	dtque	☐
	dtstore	☐
	dttmp	☐
	old	☐
	Windows XP trash box	☐
Checking the window displays (no unnecessary windows must appear; the same applies after rebooting)	Operate from the Windows XP desktop.	☐
	Taskbar	☐

Checkpoint	Checkpoint details	Check
Inserting the backup floppy disk and checking the backup files	Create the backup files in floppy drive by re-starting. (Cannot be used in automobile)	☐
Backing up ccr folder	D:ccr	☐
Registering in startup. (Check by rebooting)	Check that the CXDI software starts.	☐
	Check that no /d, /np or other flags have been raised.	☐
Communication with X-ray generators	kV, mA, msec, body part settings, etc.	☐

[Table.1]

8 Dimension

(1) Imaging Unit



Mass

(60G Imaging Unit)

2.5 Kg (w/o cable)

2.8 Kg (inc. 1.5m cable)

(60C Imaging Unit)

2.5 Kg (w/o cable)

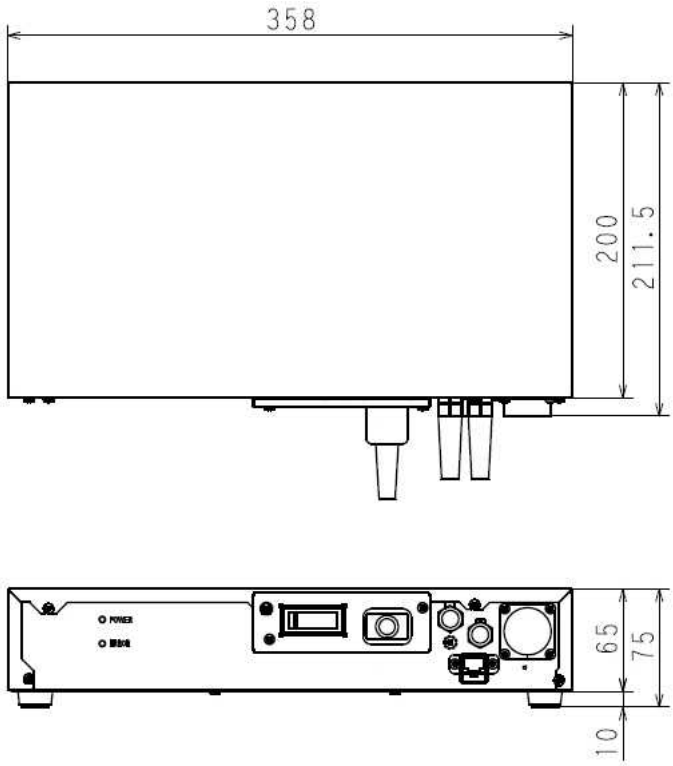
2.8 Kg (inc. 1.5m cable)

Unit: mm

Dimension tolerance: ± 1

(Scale 1:N)

(2) Power Box



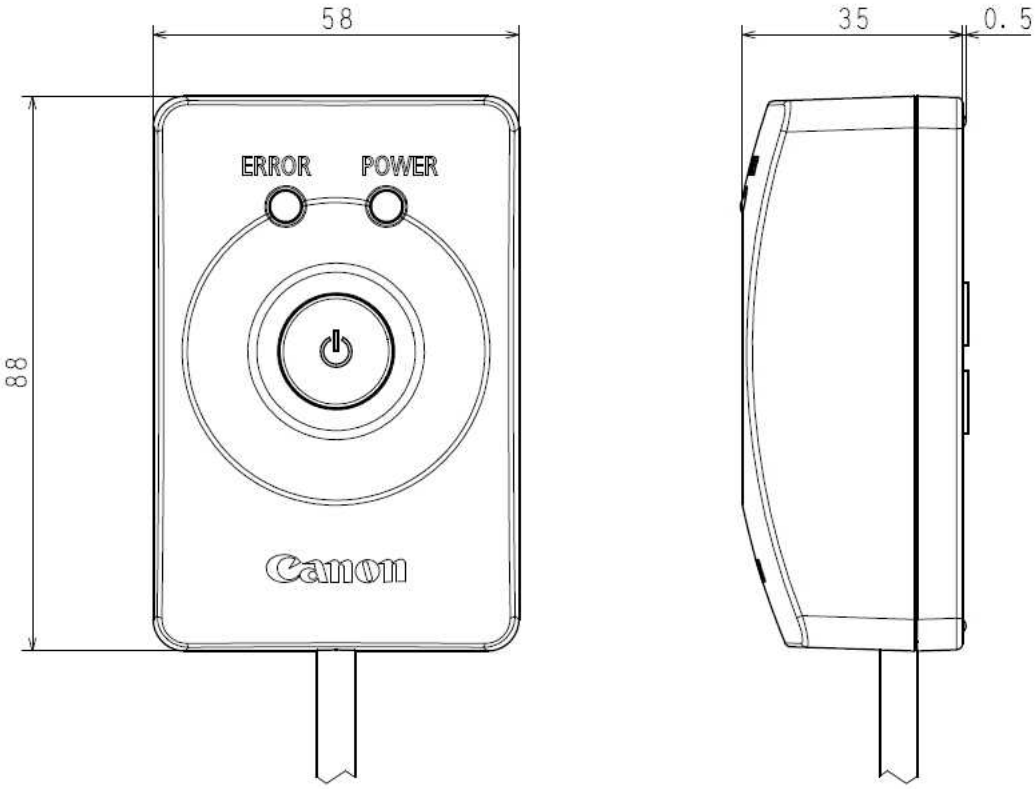
Mass: 3.7 Kg

Unit: mm

Dimension tolerance: ± 1

(Scale 1:N)

(3) Remote Switch



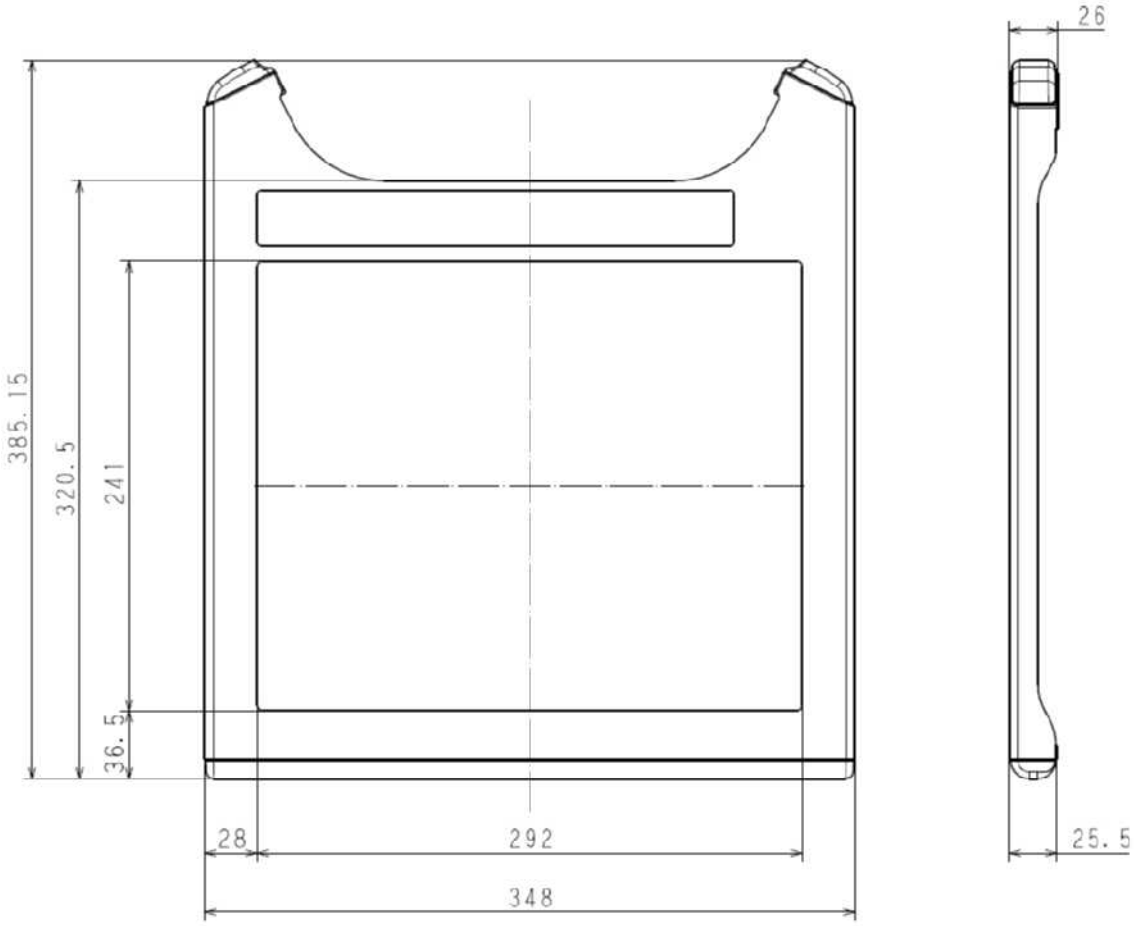
Mass: 0.9 Kg (inc. cable)

Unit: mm

Dimension tolerance: ± 1

(Scale 1:N)

(4) Grid (Optional)



Mass: 0.6 Kg (Frame only)
1.1 Kg (4:1)
1.3 Kg (8:1)
1.4 Kg (10:1)

Unit: mm
Dimension tolerance: ± 1
(Scale 1:N)

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CXDI-60G/60C

3. Function

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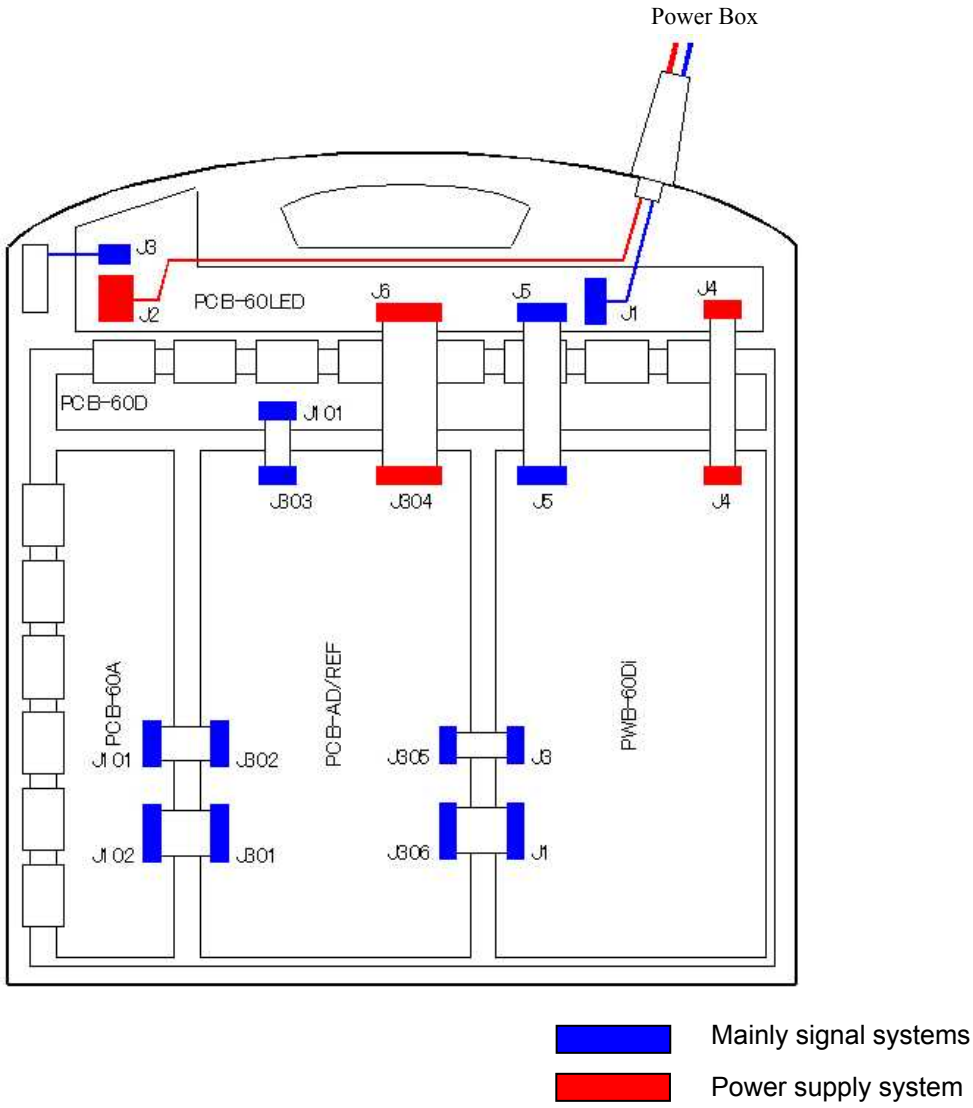
1 Imaging Unit

1.1 Block Diagram (Imaging Unit)



1.2 Imaging Unit

The imaging unit consists of the sensor unit, sensor cable S150-60/P630, cover unit and sensor information file unit.

(1) Converts the acquired X-ray image to light signal using the fluorescent screen and stores.

(2) After reading the stored electric signal (Image) from the sensor, perform the A/D conversion and stores it on the frame memory temporally.

(3) Reduce the electric signal at the same time as storing and transfer it to the Control computer through the Power Box.

(4) After the reduced images have been imported, the unit transfers the images in the frame memory in the same way.

1.2.1 Sensor data file unit

The data unique to the sensor (LANMIT) are recorded on the file. The sensor data is recorded inside the sensor unit, and automatically downloaded to the control PC as sensor data file by the control software.

1.2.2 Sensor cable S150-60 (imaging unit side)

This cable on the imaging unit side is connected to the sensor cable P630 (power box side) using a connector. It is used for the connection between the imaging unit and power box, and it incorporates the following functions:
-Communication between the Imaging unit and Control computer via the power box.
-Power supply from the Power box to the Imaging unit.
-Communication between the Imaging units and Power Box.
The cable can be disconnected at the installation site by opening the access cover on the rear panel of the imaging unit. However, this job should be performed only by a service engineer or a medical engineer (ME) who has completed the service training, and users are not permitted to perform it.
The sensor cable S150-60 is 1.5 meters long.

1.2.3 Sensor cable P630 (power box side)

This cable on the power box side is connected to the sensor cable S150-60 (imaging unit side) using a connector. It is used for the connection between the imaging unit and power box, and it incorporates the following functions:
-Communication between the Imaging unit and Control computer via the power box.
-Power supply from the Power box to the Imaging unit.
-Communication between the Imaging units and Power Box.
The cable is connected by the connector on the power box side and users are permitted to replace the cable.
The sensor cable P630 is 6.3 meters long.

1.2.4 Grid unit (optional)

This is the external fixed grid can attach and remove.
The three types of grids in the table below are provided.

	Grid ratio	Convergence distance	Grid density
1	10:1	110cm	40 LP/cm
2	8:1	110cm	40 LP/cm
3	4:1	110cm	40 LP/cm

1.2.5 PWB-60Di board

This board incorporates the CPU and other digital circuits for controlling the imaging unit by, for instance, driving the sensors, temporarily storing the image data in the frame memory, and outputting the image data using Ethernet.
Its main functions are described below.

(1) It controls the sensor drive, and imports the A/D-converted X-ray digital images.

(2) The communication, the X-ray digital image transferring with the Control PC through the Power Box on the Ethernet.

(3) The synchronization between the X-ray generator and the image acquisition through the Power Box.

(4) It controls the LED displays which indicate the statuses of the imaging unit.

(5) Detecting the Grid by using the Grid detecting sensor.

(6) It detects abnormal temperature rises using the temperature sensor, outputs errors and restricts the sensor drive.

1.2.6 PCB AD/REF board

This board incorporates the A/D converter, which converts into digital data the analog signals that correspond to the X-ray images output from the pixels on the sensor, and the analog circuits which generate the reference voltages.
Its main functions are described below.

(1) Relaying the drive power to the amplifier IC

(2) Relaying the control signals to the amplifier IC

(3) Converting the analog signals from the amplifier IC into digital data

1.2.7 PWB-60 LED board

Connected to this board is the sensor cable S150-60 (imaging unit side), and the board itself has a function for distributing the power from the power box to the PWB-60Di and PCB AD/REF and a function for relaying the Ethernet and LVDS communication signals between the PWB-60Di and PWB-60XRAY inside the power box. It also incorporates the LEDs for displaying the status of the power supplied to the imaging unit, the operation status of the imaging unit and the status of communication using Ethernet.
Its main functions are described below.

(1) Power supply relaying

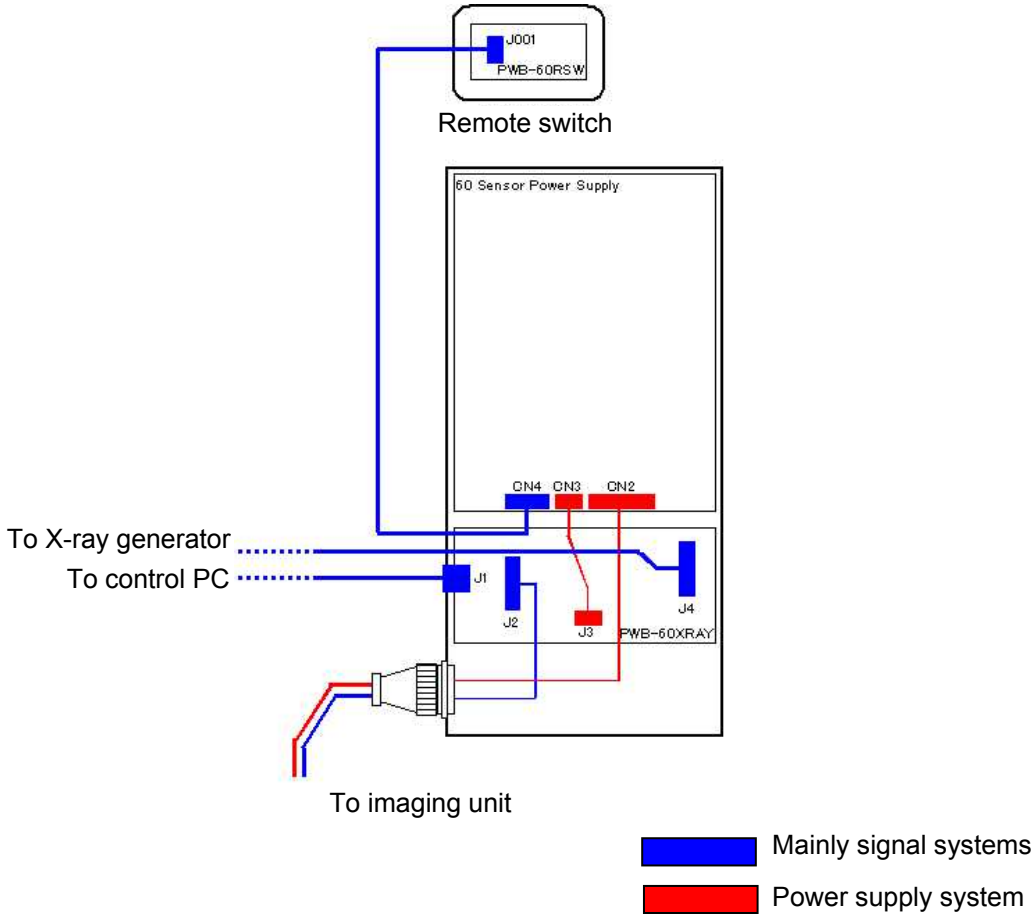
(2) Slow start control when power is supplied

(3) LED displays which indicate the statuses of the imaging unit

(4) The connection of Grid detecting sensor.

(5) Single-point grounding of power supplied to top cover

2 CXDI SYSTEM II



The CXDI SYSTEM II unit consists of the power box, cable with AC plug, X-ray interface cable and remote switch.

2.1 Power box

This consists of the 60 sensor power supply, PWB-60XRAY board and X-ray power cable assembly, and it incorporates the functions for transferring signals between the control computer and imaging unit, supplying power to the imaging unit and relaying the signal transfer to and from the X-ray generator. One imaging unit can be connected to this board: It is not possible to connect a multiple number of imaging units. The sensor can be replaced with the other one which supports the power box by connecting the connectors of the sensor cable S150-60 (imaging unit side) and sensor cable P630 (power box side). Before the sensor is replaced, the power of the power box must be turned off. Trouble may develop in the system if the sensor is replaced with the power on.

2.2 PWB-60XRAY board

This board incorporates the interface with the X-ray generator, pulse transformer which relays the Ethernet communications with the control PC while providing insulation (AC 230V, basic insulation), and the initialization switches which boot the Ethernet settings using the factory settings.
Its main functions are described below.

(1) Interfacing with the X-ray generator

(2) Relaying the Ethernet communications while providing insulation (AC 230V, basic insulation)

(3) Setting the length of the sensor cable to 3 or 7 meters
The sensor cable is used at the 7-meter length setting.
7 meters: Short between pins 6 and 8 of JP1 using a jumper socket.
3 meters: Short between pins 7 and 8 of JP1 using a jumper socket.

(4) Switches for booting the initialization codes of the imaging unit firmware

2.3 X-ray interface cable

This cable is used to connect the X-ray generator and power box. The cable is 20 meters long.
Its main functions are described below.

- Transferring the requests for X-ray exposure
- Transferring the exposure permission to the X-ray generator

2.4 Remote switch

This external switch is for turning on and off the secondary output of the power box. No power is supplied to the imaging unit while this switch is set to OFF, but standby power is consumed.

2.5 60 Sensor power supply

(1) ACDC power supply Imaging Unit mainly use

Rated power supply (input): AC 100 to 240V

Rated power supply (output): CH1 10.5V, CH2 6.4V, CH3 9.7V, CH4 23V

(2) Added function

a) Over current protection: At detecting the over current, shutdown is performed automatically

CH1: 5.0A or more

CH2: 3.0A or more

CH3: 0.8A or more

CH4: 0.4A or more

b) Over Voltage protection: When detecting the over voltage, shutdown is performed automatically.

Over 115% of the rated voltage

c) The switching (ON/OFF) of the secondary output voltage by using the remote ON/OFF controller is available.

Secondary output display: LED (Blue)

3 About the Power Box Initialization Switch

Initialization Switch

The LAN can be started with the factory settings when you turn on the power (the main power of the power box and remote switch) by holding down the initialization switch (see figure *1) of the power box.

The firmware of the imaging unit contains the initialization and normal codes.

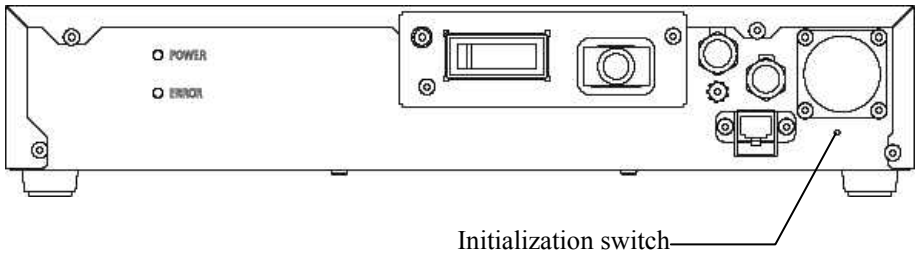
(They are stored in the PWB-60Di flash ROM)

Normally, the normal code runs on a steady basis, and only normal code is updated when upgrading the firmware.

Use the initialization code when the normal code cannot start for some reason or when you have lost the Ethernet settings. Using the initialization code sets the Ethernet-related settings to the default settings and allows you to perform the startup operation for the initialization code.

In this case, the connection can be made by setting the Ethernet settings in the control computer to the imaging unit default*2.

This default connection allows you to upgrade the firmware again and also check and set the Ethernet settings again in order to recover the system.



*1 Initialization Switch: Switch 1 mounted on PWB-60 XRAY
*2 Default settings: IP Address=192.168.100.11 (factory setting)

4 How to Access the OS

This is the procedure for shutting down the CXDI software and accessing to Windows.

1.1 Preparation

Prepare a keyboard and mouse.

1.2 Notes

(1) Never perform the following operation when the CXDI software is operating, such as during QA process, image transfer, communication with RIS or generator, etc.

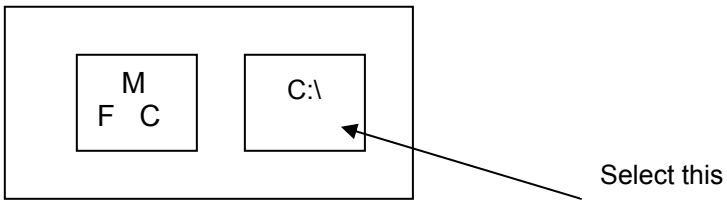
(2) Access to the OS is allowed only by the service engineer. Since important settings and files are saved, never let the user access the OS because CXDI system will not operate normally if the operation is not performed properly.

1.3 Procedures

(1) Turn ON the power of the control PC.

(2) When the operation screen appears, press [Alt] and [Tab] keys on the keyboard together.

(3) Keep [Alt] key pressed even after the display as shown below appears. Press [Tab] key while pressing [Alt] key to select the command prompt window.



(4) CCR Console Menu will appear. Press [Esc] key. [***** Welcome to CCR *****] will appear. Enter 8 after "Enter item:" and press [Enter] key.

```
***** Welcome to CCR ******
1 Set-Up…          5 –
2 Display Set-Up   6 –Utilities…
3 Image Util…      7 – Debug
4 –                8 – Exit
Enter item: 8
```

(5) A message prompting you to press a key will appear. Press any key. The CXDI software will shut down.

(6) Desktop screen of Windows XP will appear.

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CXDI-60G/60C

4. Repair Guide

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1 Notes

1.1 Repair and Maintenance

In order to ensure safety, the best performance, repair, and maintenance work can only be performed by the technicians who have received the service training specified by Canon Inc.

1.2 Removing the external cover

When removing the covers (access cover, cover on the power box, etc.,) during maintenance, repair, etc., perform the work after switching the power off. Never touch the device with wet hands, as there is a risk of electric shock.

Before proceeding with repairs, ensure that the static accumulated in the bodies of the installation personnel is discharged. Similarly, before touching the PCBs (when removing them) or cable connectors, ensure that all static is discharged.

1.3 Durability of detachable cable connector

- Cycle life of the detachable cable connector: 4000 cycles.
- Make sure that the power is off before connecting and disconnecting the detachable cable.

Replacing the Sensor Cable Periodically

Communication error may occur if the connection cycle is over 4,000 times.

Monitor the mate/unmate cycles and status of usage at the hospital and encourage periodic cable replacement by way of prevention and maintenance.

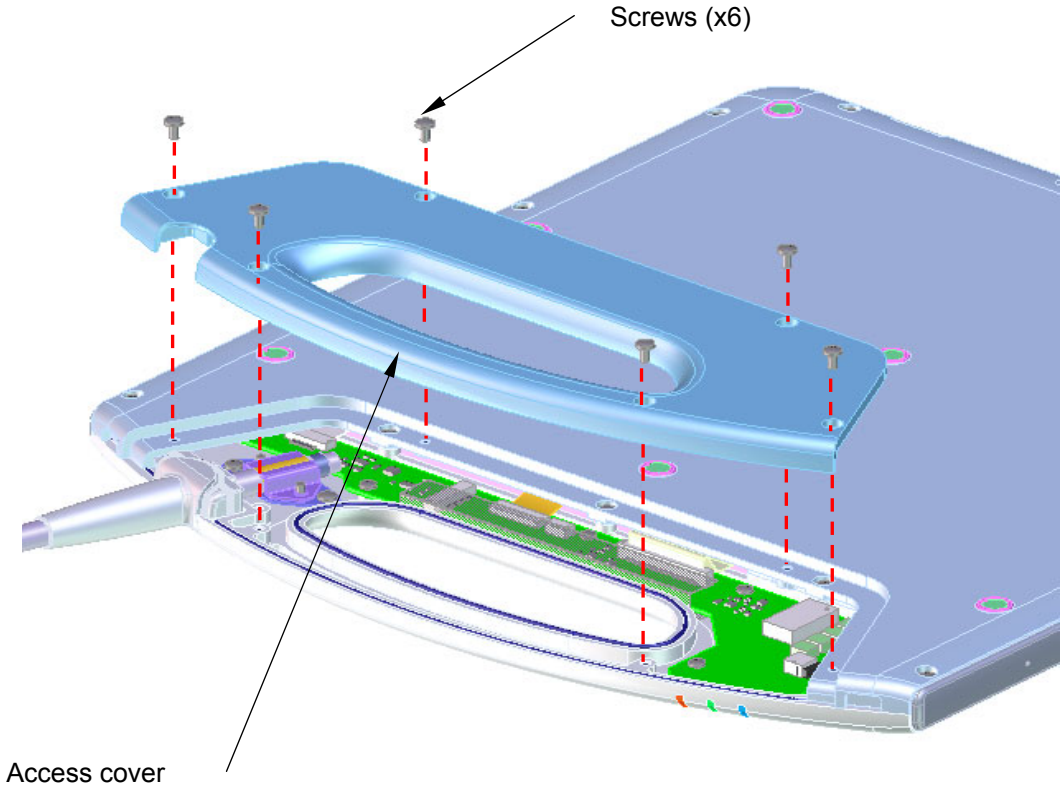
Frequency	10 times per day	Five times a day	Two times a day
Replacement schedule (by day)	400 days	800 days	2000 days
Replacement schedule (by month)	16 months	32 months	80 months

Number of operating day: 300 days a year

2 Disassembly/Reassembly

2.1 Removing the access cover

1) Remove the six mounting screws (M3x6mm) for the access cover.
2) Lift the access cover to remove it.



Notes:

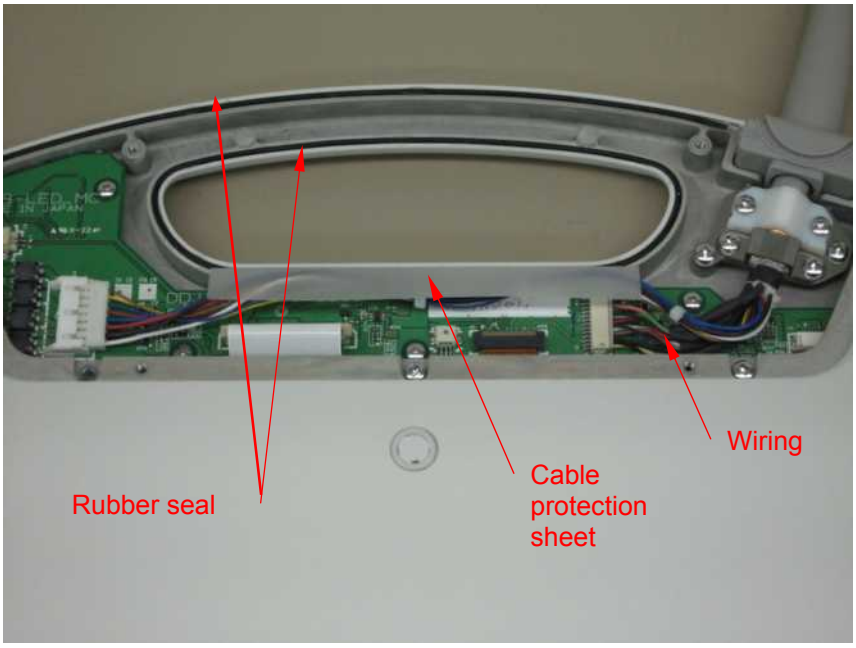
1. ***The access cover is an exterior part: Handle it carefully to avoid denting or marking it.***
2. ***Be careful not to dislodge the rubber seal.***

2.2 Attaching the access cover

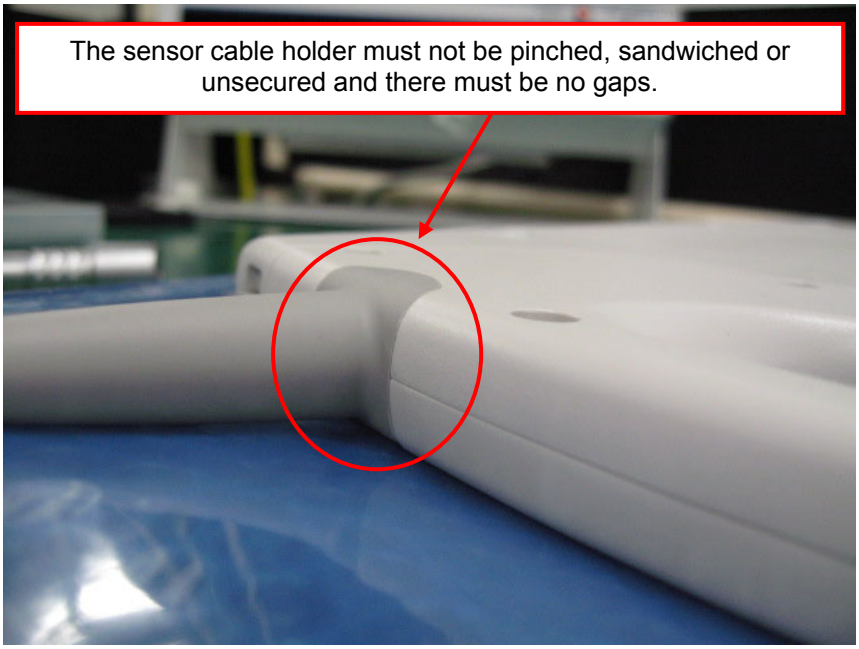
1) Check that the rubber seal, wiring and cable protection sheet have been placed in their prescribed positions.
2) Install the access cover in such a way that it does not pinch or sandwich the rubber seal, wiring or cable protection sheet.
3) Attach the six mounting screws (M3x6mm) for the access cover.

Notes:

1. ***No foreign matter must be allowed to enter.***
2. ***Be careful not to dislodge the rubber seal.***
3. ***Take care not to pinch or sandwich the rubber seal, wiring or cable protection sheet.***



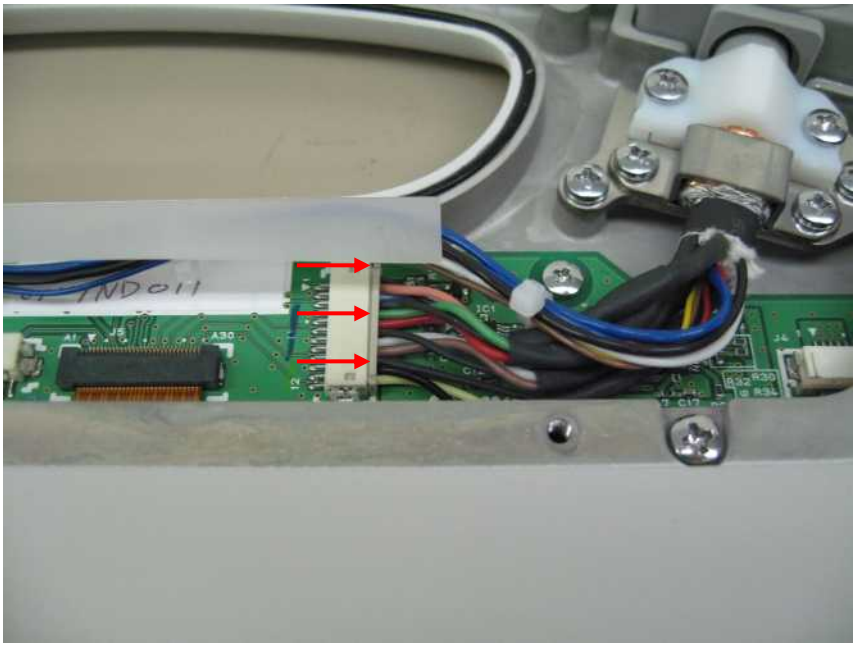
4) Check to see that the sensor cable holder is not pinched, sandwiched or unsecured and that there are no gaps.



2.3 Replacing the sensor cable

1) Disconnect the connector of the sensor cable which is connected to the J2 connector on the LED board.
Do not pull the wires to disconnect the connector. Using needle-nosed pliers, push the three positions uniformly indicated by the red arrows in the picture below. Be careful when removing the connector so as to avoid damaging the connector.
After disconnecting the connector, check that the IC soldered to the LED board is not damaged.

2) Disconnect the connector of the sensor cable which is connected to the J1 connector on the LED board.
Do not pull the wires to disconnect the connector. Using needle-nosed pliers, push the three positions uniformly indicated by the red arrows in the picture below. Be careful when removing the connector so as to avoid damaging the connector.
After disconnecting the connector, check that the IC soldered to the LED board is not damaged.

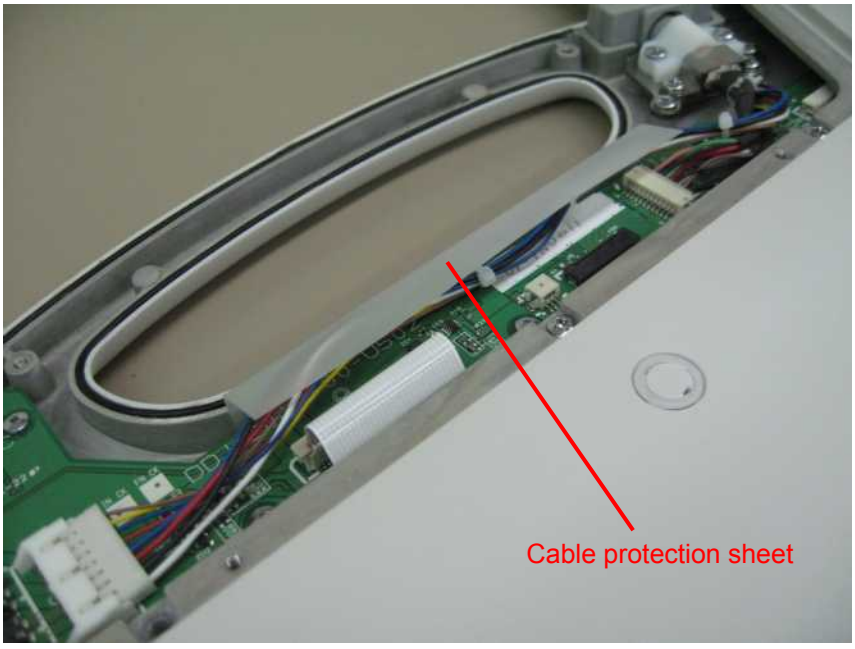


4. Repair Guide

Remove the two screws (M3x6) of the cable clamp plate, and disconnect the sensor cable.

4) Connect the connectors and replacement sensor cable in the sequence of steps 1) to 3). **After connecting the connectors, check that the IC soldered to the LED board are not damaged.**

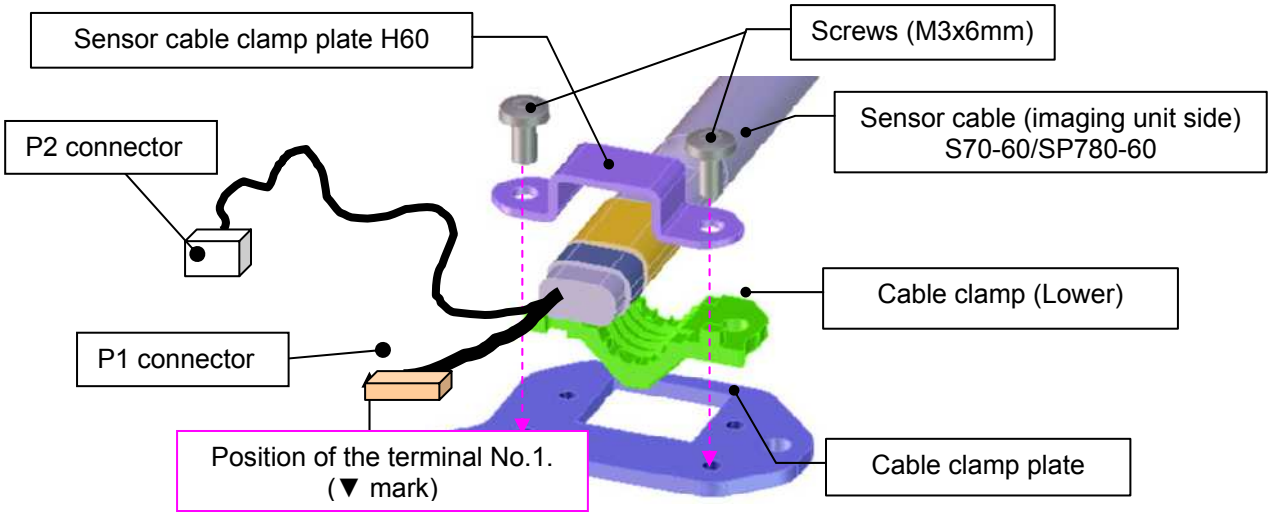
5) Route the P2 connector wire bundle of the sensor cable inside the cable protection sheet.



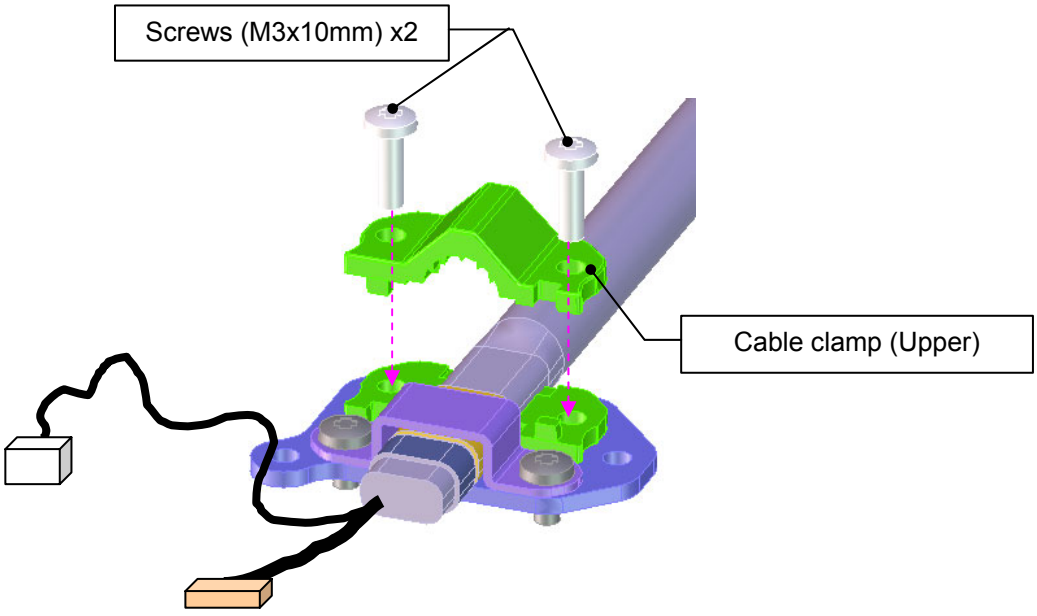
Replacing with the optional sensor cable

Cable clamp plate is not supplied with the optional sensor cable (S70-60/SP780-60) and therefore you need to attach the cable clamp to the sensor cable by following the steps below.

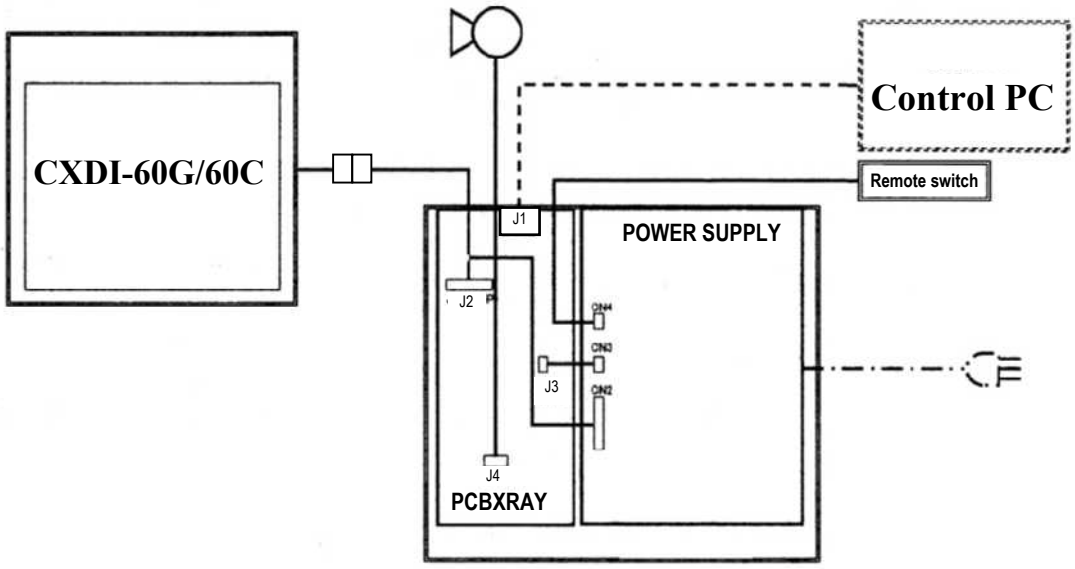
1) Mount the cable clamp (lower) on the cable clamp plate.
   * Make sure that the cable clamp (lower) is in the correct orientation.
2) Mount the sensor cable (optional) on the cable clamp (lower)
3) Hold the copper foil part of the sensor cable with the sensor cable clamp H60. Match the edge faces of the copper foil and the cable clamp plate. Fasten them by the two screws (M3x6mm).
   * Fit the position of the Terminal No.1 of the P1 connector (V-shaped mark) to the position as illustrated below. Fix the sensor cable.
   * Be aware not to pinch or sandwich the wires.
   *Reference value for the tightening torque: 12kgf·cm (117.6N·cm)



4) Fasten the cable clamp (upper) to the cable clamp plate by the two screws (M3x10mm).
   * Reference value for the tightening torque: 8kgf·cm (78.4N·cm)



2.4 Removing the PWB-60XRAY



POWER BOX

1. Disconnect the cable connectors from the PWB-60XRAY.

   1) Distribution the two cables
   2) X-ray interface cable
   3) Remote switch cable
   4) 60 power cable

2. Loosen the screw (M3x6mm) used to secure the PWB-60XRAY, and remove it.

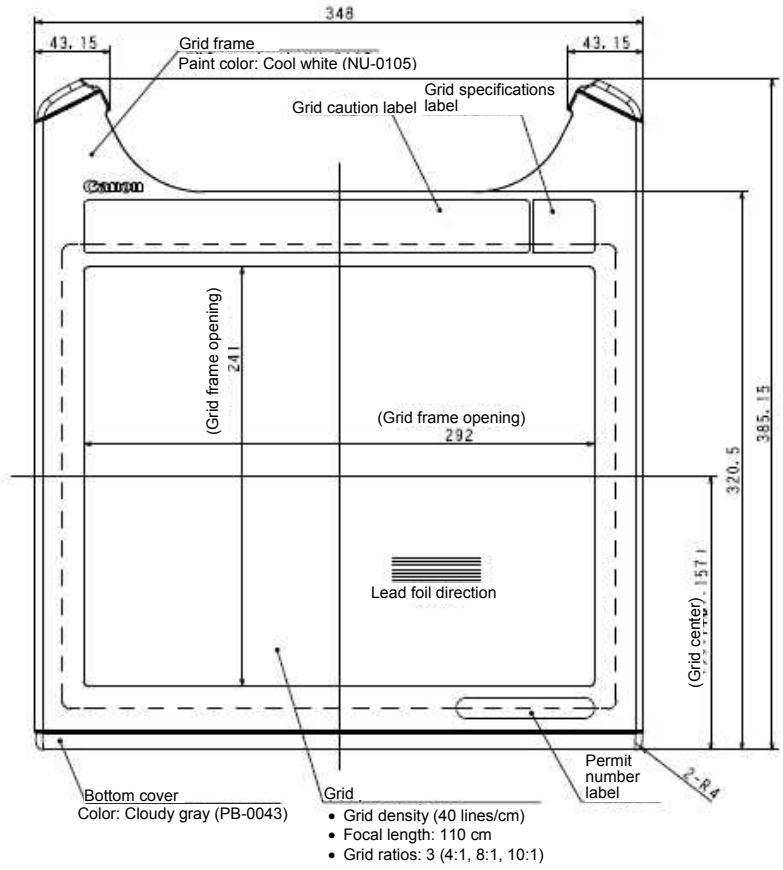
Notes:

1. ***Do not pull the wires to disconnect the connectors.***
2. ***Be absolutely sure to disconnect the AC power cable first.***

3 Adhering the Grid

3.1 Introduction

At the sales company, a grid is adhered to the grid frame unit (option) using a grid sticking tool. The grid should be obtained by the sales company. *Among the grid units available as options, the AL grid made by Mitaya Manufacturing Co. serves as the standard unit.



3.2 Required specifications

- Grid dimensions (width x height):
  The grid dimensions must be 317 (W) x 267 (H) mm (allowable error: 0/-1 mm).

- Effective area:
  The effective area must be 292 mm (W) x 242 mm (H).
  The outer edge center and effective area center must be the same (allowable error: 0/-1 mm).

- Grid dimension (thickness):
  3.5 to 3.7 mm (grid thickness + adjustment spacer + thickness of adhesive tape)
  If this thickness dimension of 3.5 to 3.7 mm is not satisfied, unsteadiness, locking difficulties or other trouble may arise when the grid unit is mounted on the imaging unit.

Reference: CXDI-60G/60C optional grid unit (The grids made by Mitaya Manufacturing Co.)

Grid			Spacer		
Grid ratio	Focal length	Thickness	Spacer (L)	Spacer (S)	Thickness
4:1	110 cm	1.2 mm	BA5-0322	BA5-0323	1.5 mm
8:1	110 cm	2.0 mm	BA5-0325	BA5-0326	0.7 mm
10:1	110 cm	2.4 mm	BA5-0328	BA5-0329	0.3 mm

* Thickness of adhesive tape: Approx. 0.9 mm (two types are used)

- Grid foil direction:
  User-selected. However, it must be parallel to the lengthwise or widthwise direction.

- Grid lattice density:
  40 lines/cm +/-5% (fluctuations in number of lines per unit: less than +/-1%)

- Grid ratio/Focusing distance:
  User-selected

- Grid surface (for EU):
  Biological safety (EN ISO 10993-1/5/10) must be taken into account for the surfaces that can come into contact with the patient.

- Grid mounting angle:
  The tolerance must be less than 1 degree for the angle at which the grid is mounted vis-a-vis the rows of sensor pixels.
  However, an angle of less than 0.3 degree is preferred for optimal functioning of the grid stripe reduction process.
  Note: Mounting angle = Relative angle between the sensor pixel rows and grid stripe

- Recommended grid manufacturers:
  Mitaya Manufacturing, SMIT, JPI

- Other notes:
  Other specifications not shown above should be compliant with JIS4910-2000.

3.3 Configuration

3.3.1 Grid unit configuration

The parts required for adhering the grid to the grid frame unit are shown in the table below.

NO.	PARTS NAME	PARTS NO.	Q'TY	REMARKS
1	Grid	-	1	Obtained by the sales company
2	Grid frame unit	BM7-0061	1	Optional product
3	Grid spacer 4L (1.5 mm thick)	BA5-0322	2	4:1 grid ratio specification (stamp mark 4)
4	Grid spacer 4S (1.5 mm thick)	BA5-0323	2	4:1 grid ratio specification (stamp mark 4)
5	Grid spacer 8L (0.7 mm thick)	BA5-0325	2	8:1 grid ratio specification (stamp mark 8)
6	Grid spacer 8S (0.7 mm thick)	BA5-0326	2	8:1 grid ratio specification (stamp mark 8)
7	Grid spacer 0L (0.3 mm thick)	BA5-0328	2	10:1 grid ratio specification (stamp mark 0)
8	Grid spacer 0S (0.3 mm thick)	BA5-0329	2	10:1 grid ratio specification (stamp mark 0)
9	Double-sided tape (F9473PC made by Sumitomo 3M, 0.255 mm thick, 11 mm wide)	-	n	Used to adhere grid spacer (same tape used for all spacers).
10	Double-sided tape (Y-4930 made by Sumitomo 3M, 0.64 mm thick, 11.5 mm wide)	-	n	Used to adhere grid

* Parts indicated in blue are service parts.

3.3.2 Tools

Tools required for assembling the grid unit using a grid obtained from one of our recommended manufacturers

NO.	TOOL NAME	TOOL NO	Q'TY	REMARKS
1	STICKING TOOL, GRID	BY9-6583	1	
2	WEIGHT TOOL, GRID	BY9-6585	1	
3	Alcohol	-	1	For removing oil or grease on the adhesion surface
4	Scissors	-	1	For cutting the double-sided tape

* Tools indicated in blue are service tools.

3.4 Adhering the grid

3.4.1 Precautions

- Before assembling the grid unit, make sure that the work bench is flat and clean.

- The grid must be handled very carefully since it is not structurally strong. No guarantees are made for its ability to withstand the mechanical damage which might be sustained if the grid assembly is dropped, for instance, while the product is being used, stored or transported.

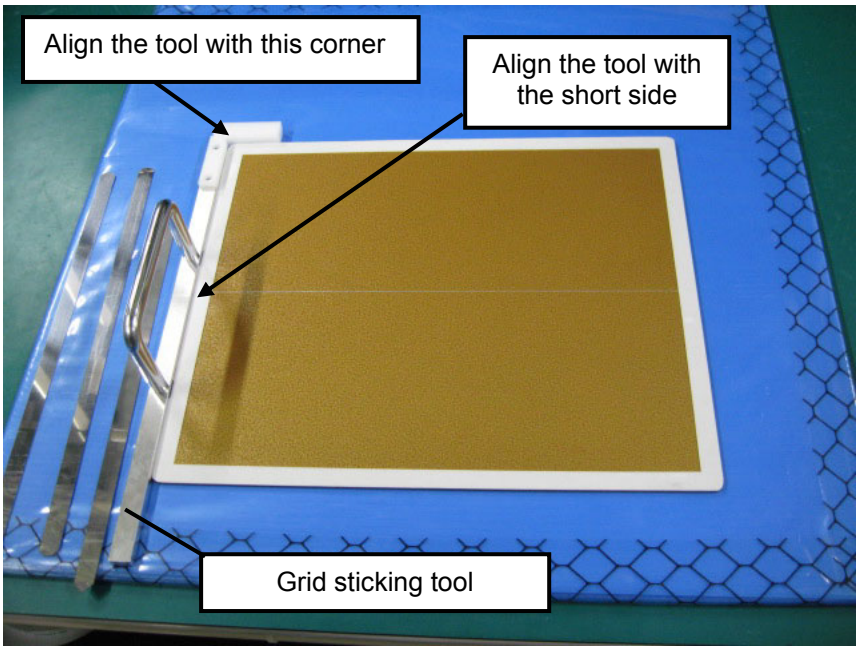
- If the grid thickness is 3.5 mm to 3.7 mm (including the thickness of the adhesive tape), the grid spacers do not need to be used.

3.4.2 Flow of grid adhesion steps

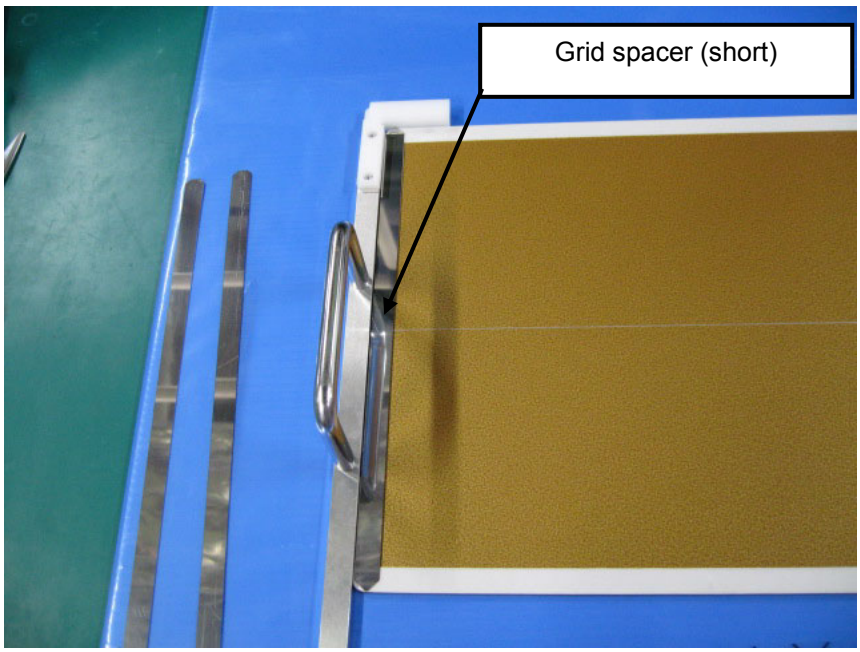
1) Adhere the double-sided tapes to the grid.
2) Adhere the grid spacers to the grid.
3) Adhere the double-sided tapes to the grid spacers.
4) Place the grid sticking tool on the grid frame.
5) Adhere the grid to the grid frame.
6) Remove the grid sticking tool from the grid frame.
7) Apply pressure to the adhered grid, place the grid weight tool on the grid, and leave standing for 20 minutes.
8) Adhere the accompanying grid labels.

3.4.3 Grid adhesion procedure

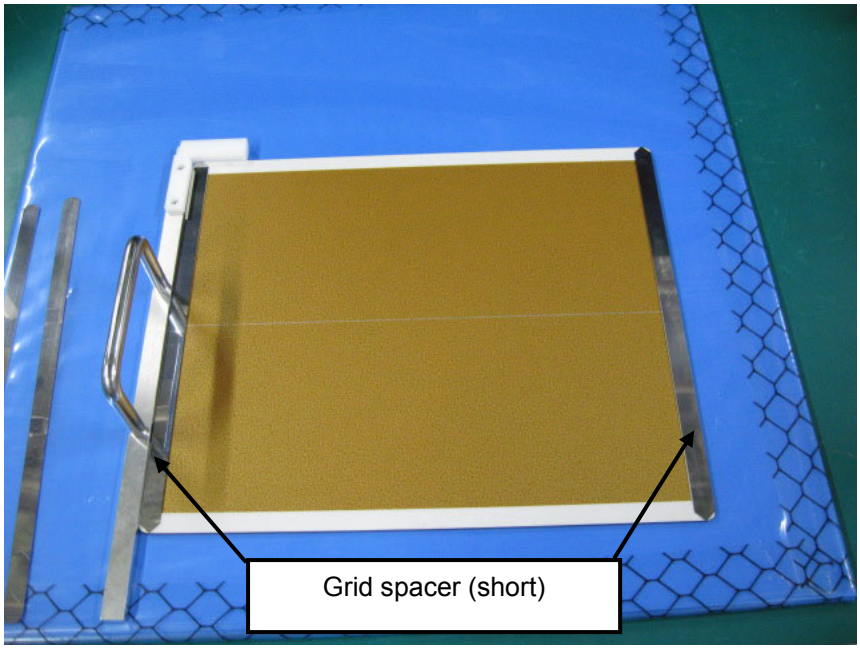
1) Wipe both sides of the grid spacers (short and long) with ethanol to remove any oil or grease.
2) Peel off the backing paper on the double-sided tape which has been adhered to the grid. If the grid does not have the double-sided tape, attach the double-sided tape (Sumitomo 3M Y-4930) to the grid after wiping the surface where the double-sided tape is attached to with ethanol to remove any oil or grease.
3) Align the grid sticking tool with the short side of the grid, and place it in position. Check that there is no gap between the grid and tool.



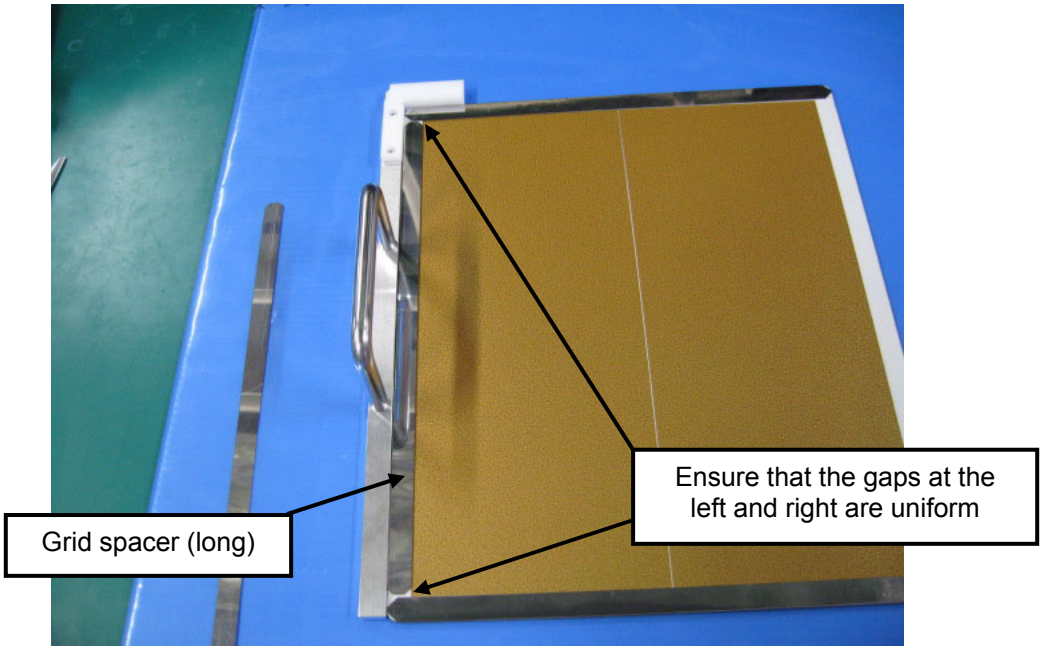
4) Align the grid spacer (short) with the inner side of the grid sticking tool, and adhere it.
*** The grid spacer must not protrude beyond the grid edge.**



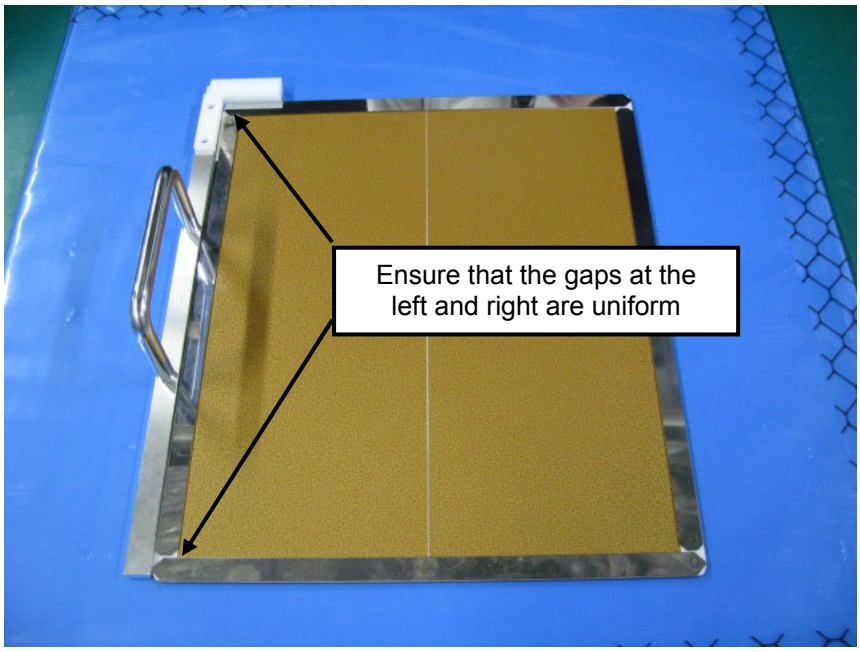
5) Rotate the grid by 180 degrees, place the tool as in step 3), and adhere the grid spacer (short).



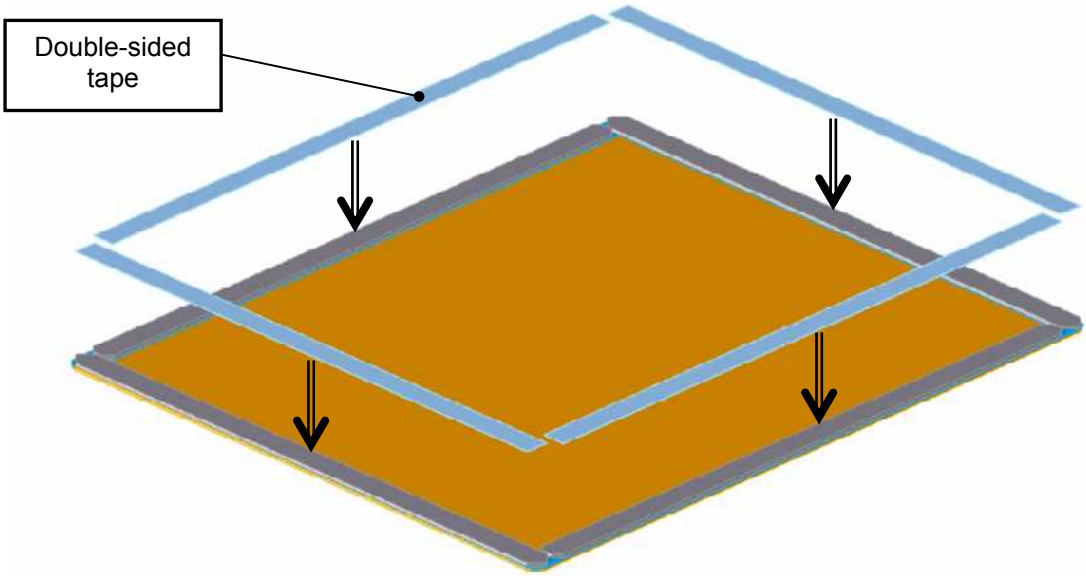
6) Align the grid sticking tool with the long side of the grid, and place it in position. Check that there is no gap between the grid and tool.
7) Align the grid spacer (long) with the inner side of the grid weight tool, and adhere it. Ensure that the gaps at the left and right are uniform.
*** The grid spacer must not protrude beyond the grid edge.**



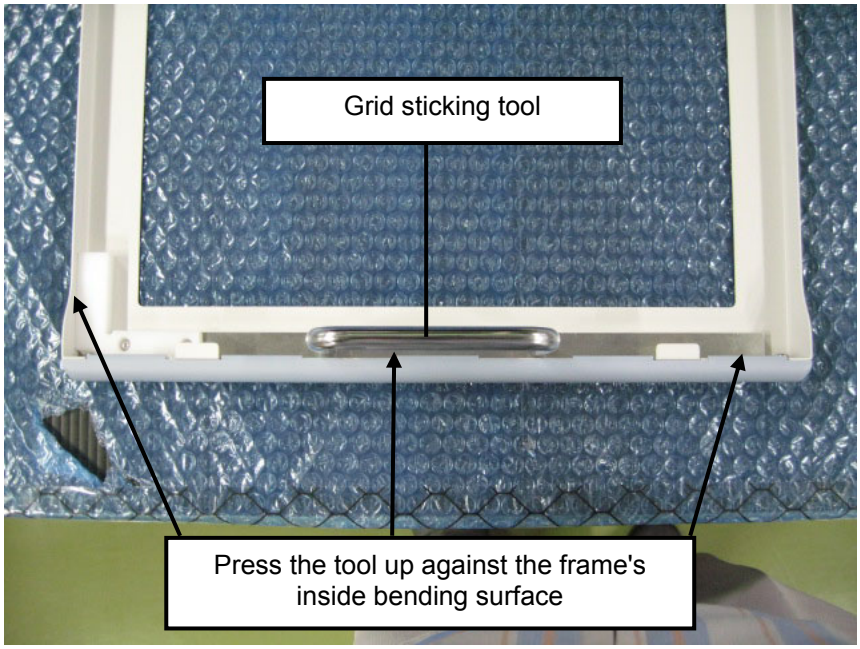
8) Rotate the grid by 180 degrees, place the tool as in step 7), provide uniform gaps at the left and right, and adhere the grid spacer (long).



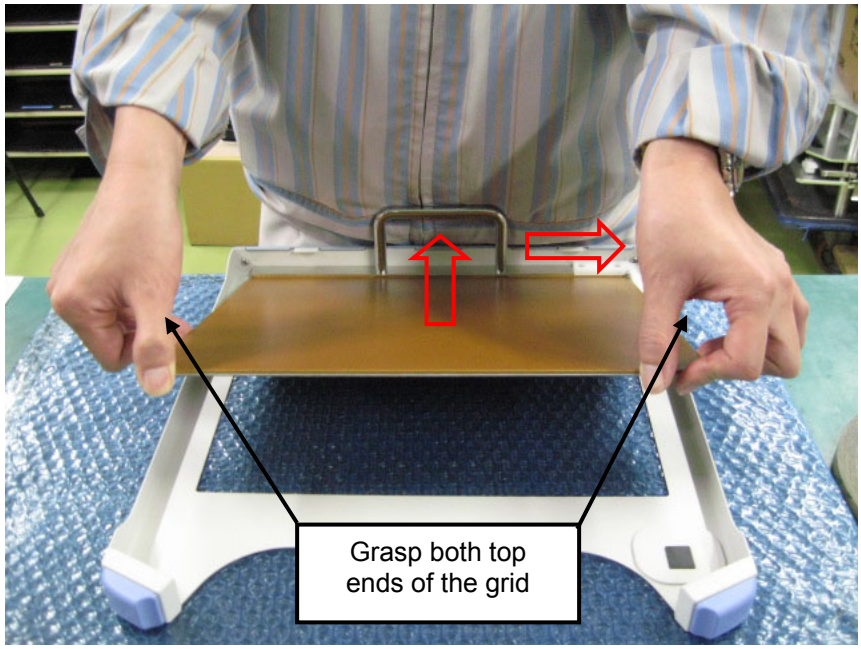
9) Apply pressure to the four grid spacers that have been adhered to the grid.
10) Wipe the tops of the grid spacers with ethanol to remove any oil or grease.
11) Adhere the strips of double-sided tape (F9473PC made by Sumitomo 3M) along the outside edges of the grid spacers.



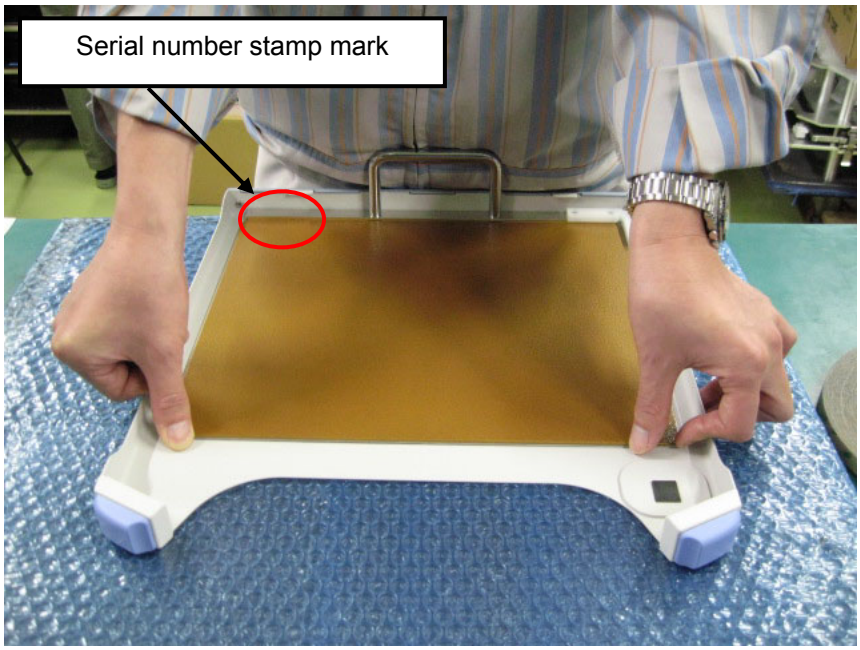
12) Peel off the backing paper on the double-sided tape which has been adhered to the grid spacers. Check that the double-sided tape has been adhered with no parts of it standing up or wrinkled.
13) Wipe around the grid frame opening with ethanol to remove any oil or grease.
14) Place the grid sticking tool so that it is pressed up against the inside bending surface (bottom side and left side) of the grid frame.



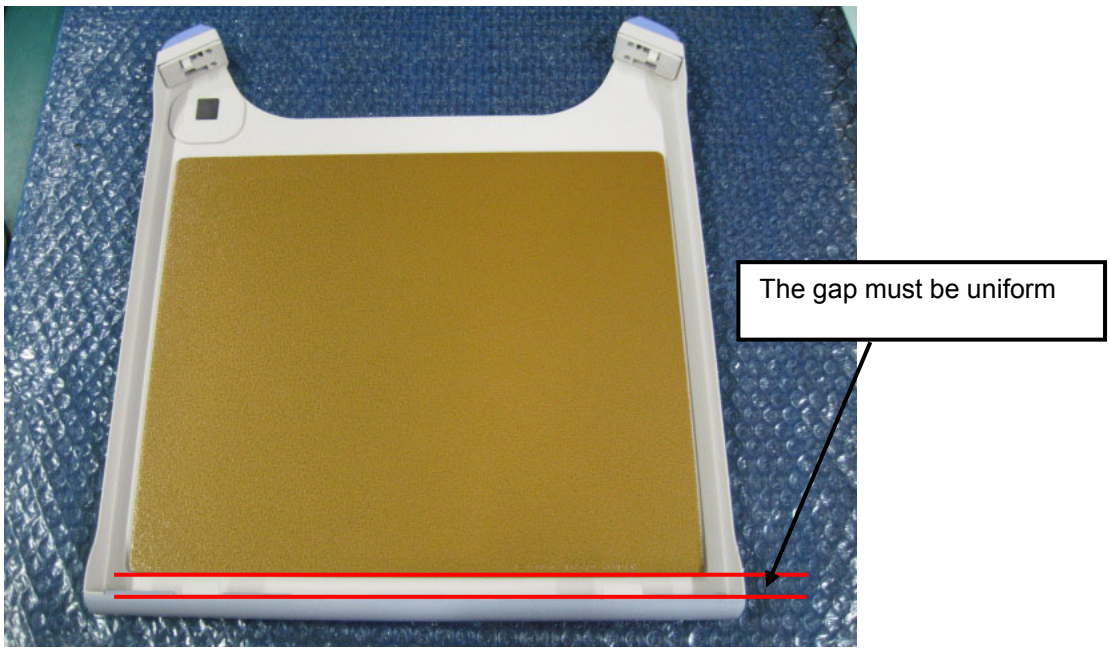
15) Support the grid frame with your body so that it will not move, and press the grid up against the grid sticking tool (bottom side and left side). Now grasp both top ends of the grid and hold the grid.
*** The grid must be installed with the serial number stamp mark at the bottom right.**



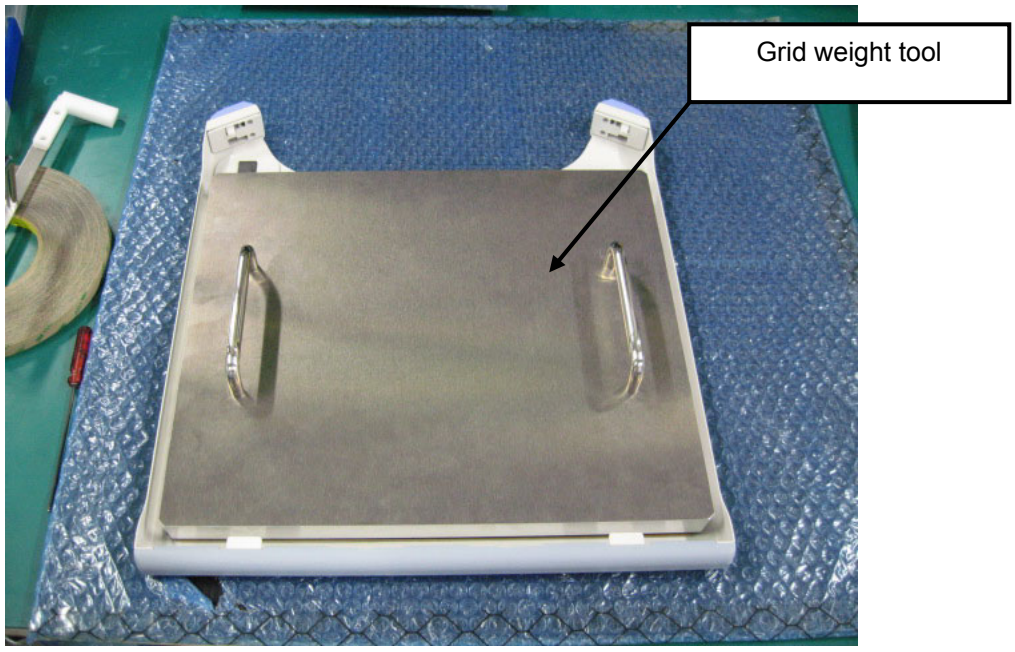
16) While holding the grid, lower it slowly using the bottom side of the grid weight tool as the axis without applying pressure.
*** The grid must be installed with the serial number stamp mark at the bottom right.**



17) Remove the grid weight tool, and check that the gap to the grid frame bending surface and grid is uniform.
*** If this gap is not uniform (if the grid has been adhered at an angle), peel off the grid from the grid frame, and repeat steps 10) to 16).**
*** A tolerance of less than one degree is acceptable in the angle at which the grid is mounted vis-a-vis the rows of sensor pixels. However, an angle of less than 0.3 degree is preferred for optimal functioning of the grid stripe reduction process.**



18) After applying pressure to the adhered area by hand, place the grid weight tool (5 kg) slowly on the grid, and leave it standing for 20 minutes.
*** Take care not to allow the grid weight tool to drop onto the grid.**
*** No guarantees are made for the adhesion strength if the tool is left under pressure for a period shorter than 20 minutes.**

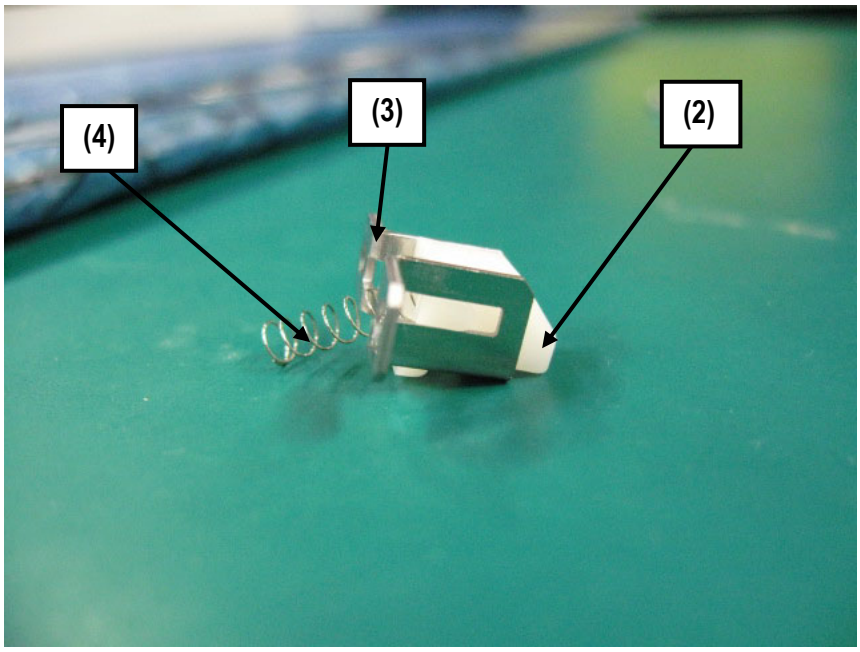


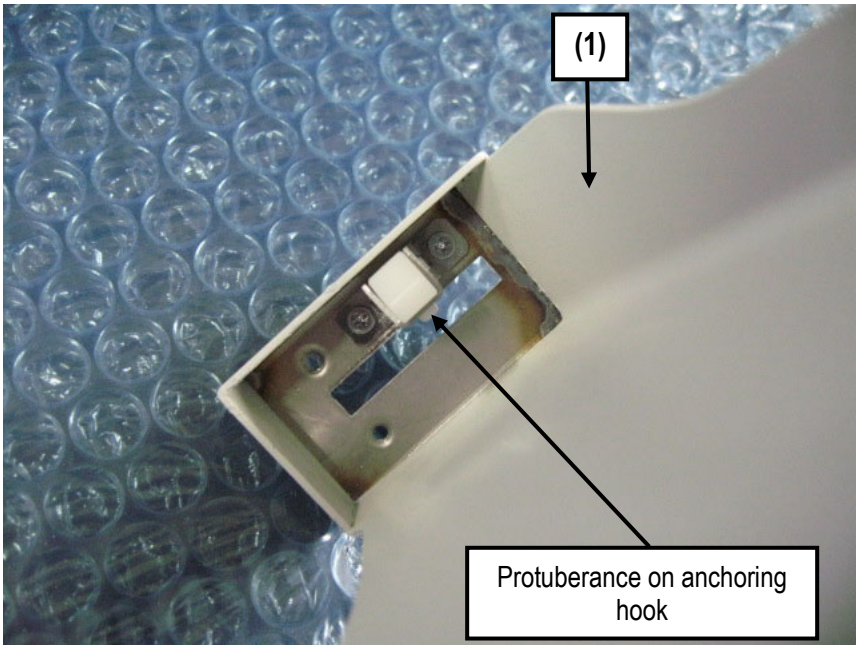
19) Use alcohol to remove any oil or grease in the area on the grid frame where the accompanying grid labels will be adhered.
20) Attach the accompanying grid labels (grid specifications label and permit number label) to the grid frame.
*** Reference: Grid made by Mitaya Manufacturing Co.**

4 Grid Lock Assembly

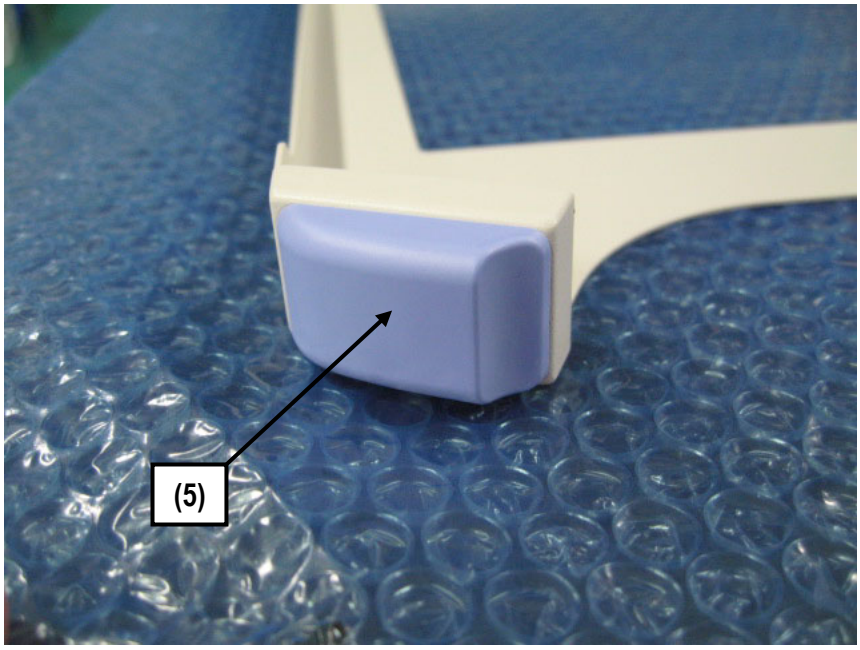
4.1 Grid lock assembly procedure

1) Fit the anchoring hook (2) into the hook slide plate (3), insert the lock spring (4) into the indentation of the anchoring hook (2), and secure the hook to the grid frame (1) using the two screws (XA1-1260-406).
*** Ensure that the anchoring hook (2) is not installed the wrong way round.**
*** The anchoring hook (2) must move smoothly after the hook slide plate (3) is secured.**
*** Be careful when tightening up the two screws so as to avoid damaging their heads.**

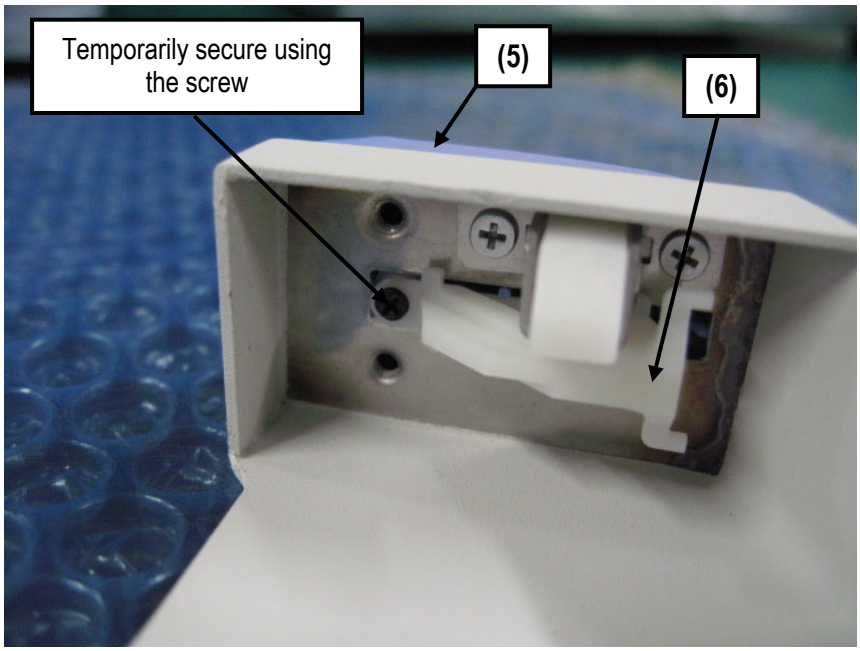




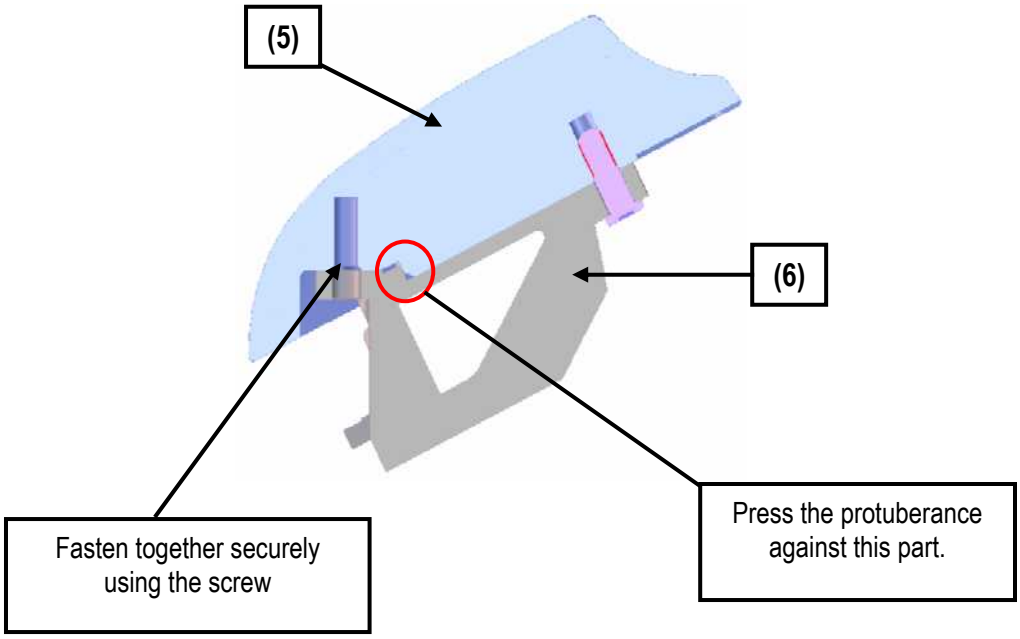
2) Install the slide switch (5) on the grid frame (1).

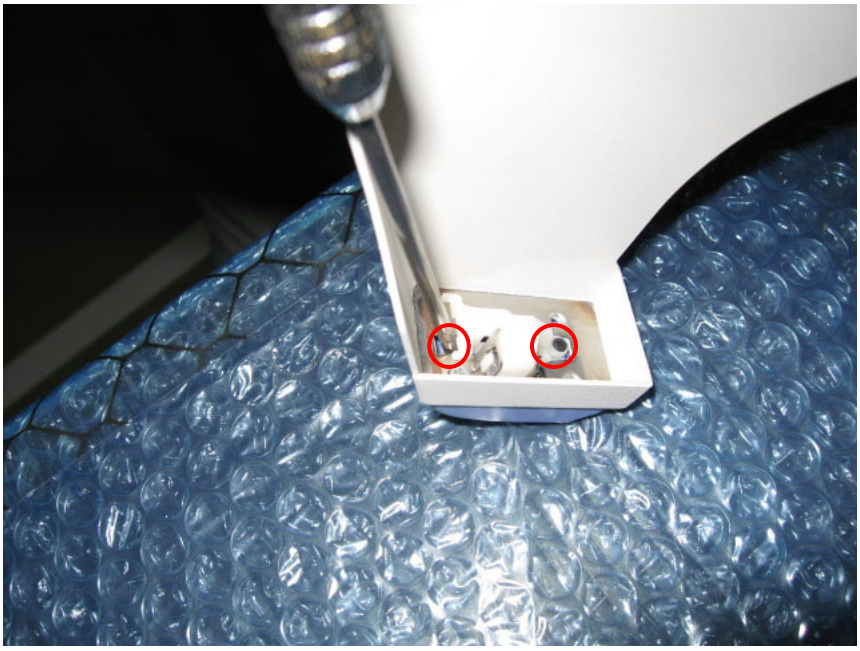


3) Temporarily secure the lock base (6) to the side switch (5) through the grid frame (1) using the screw (XA4-1200-609).

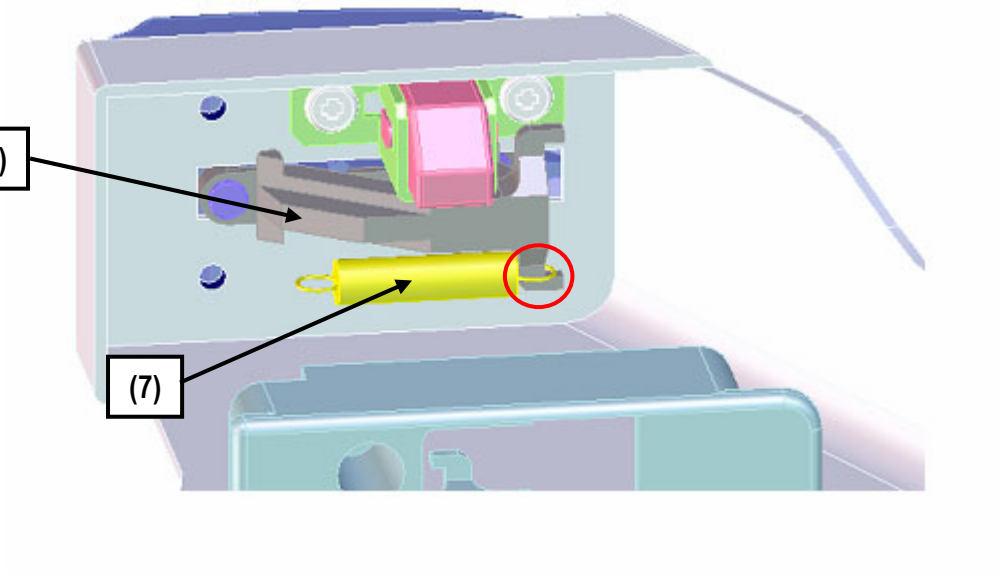


4) While pressing the protuberance on the lock base (6) against the indentation in the slide switch (5), and fasten them together securely using the screw (XA4-1200-609). Now tighten up the screw (XA4-1200-609) which was temporarily secured in step 3).
*** Bear in mind that using excessive torque for tightening the screws will damage the slide switch (6).**
*** Be careful when tightening up the two screws so as to avoid damaging their heads.**
*** Reference value for the tightening torque: 1kgf·cm (9.8N·cm)**

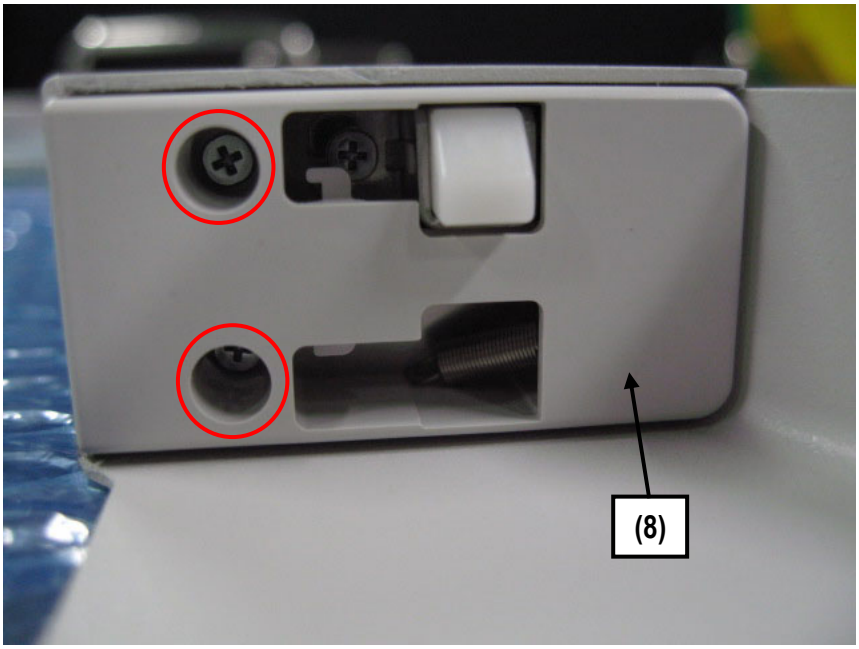




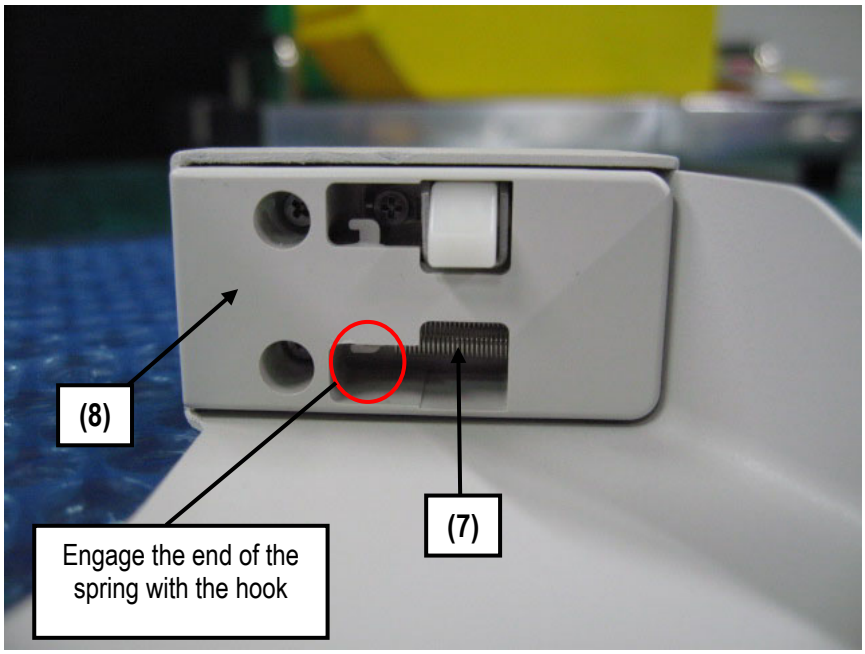
5) Engage one end of the slide spring (7) with the hook at the front of the lock base (6).



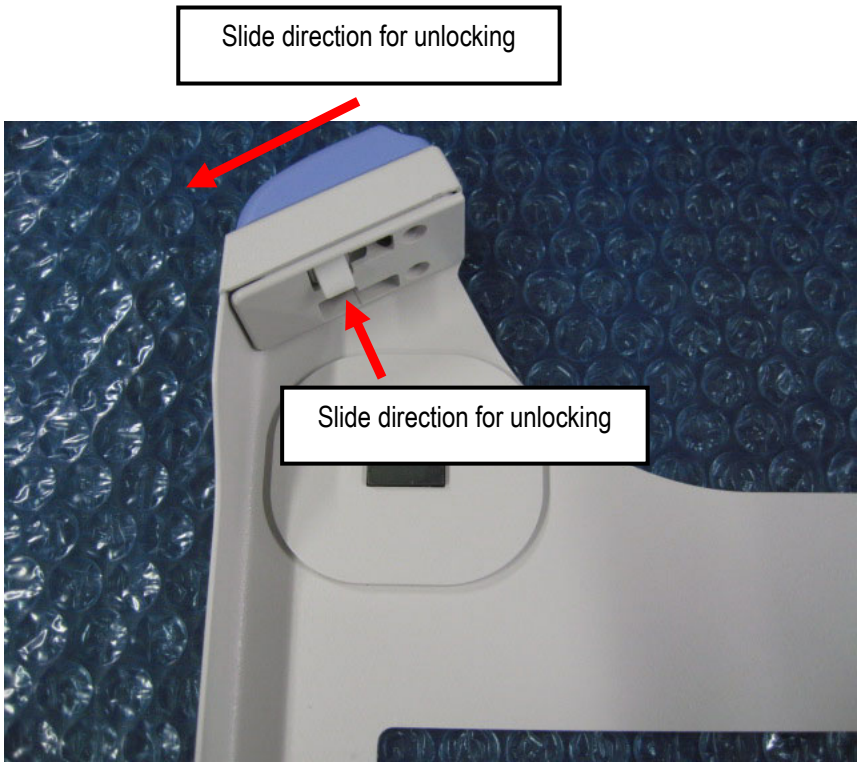
6) Fasten the lock cover (8) securely to the grid frame (1) using the two screws (XA1-1260-606).
*** Bear in mind that using excessive torque for tightening the screws will damage the lock cover (8).**
*** Be careful when tightening up the two screws so as to avoid damaging their heads.**



7) Using tweezers, engage the other end of the slide spring (7) with the hook of the lock cover (8).

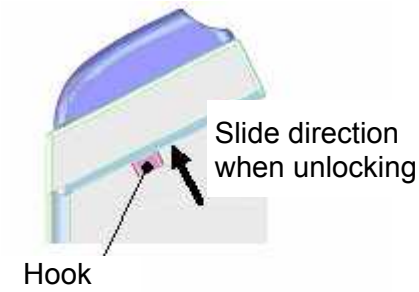


8) Move the slide switch (5) in the unlocking direction, and check that it moves smoothly together with the anchoring hook (2) to which it is linked.
*** Movement stroke of slide switch: 6 mm**
*** Movement stroke of anchoring hook: 4 mm**

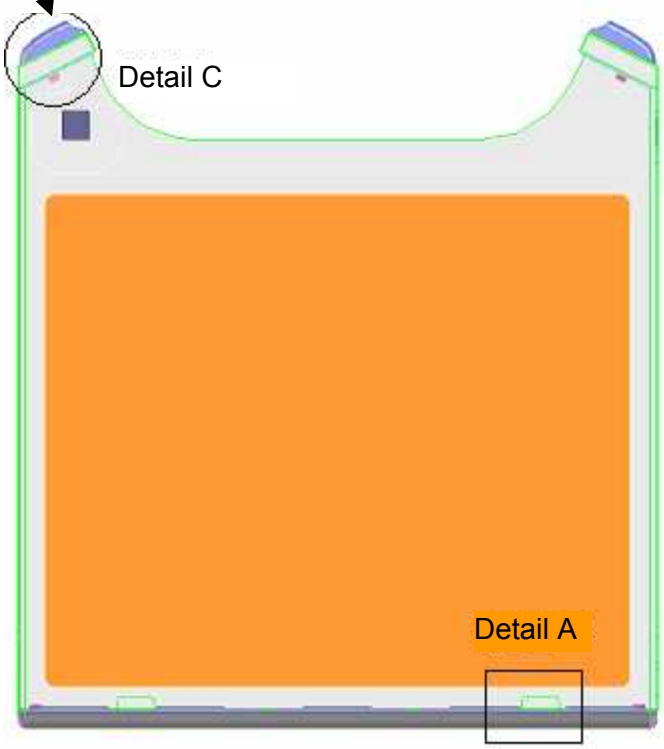


4.2 Checking the grid unit installation

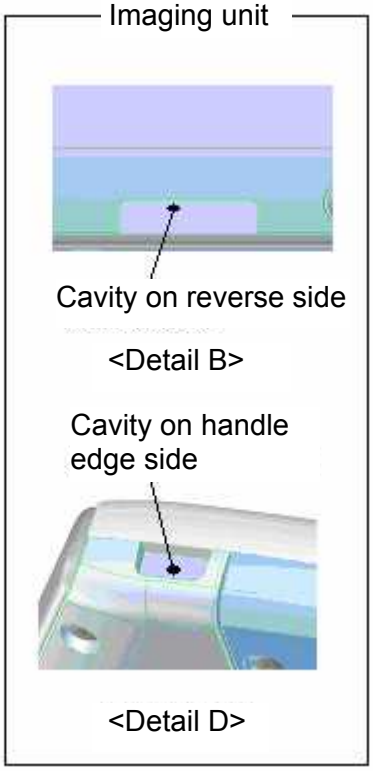
1) Clean the front and reverse sides of the grid unit.
2) With the imaging unit placed on a flat surface, hold the left and right sides of the grid unit, and fit the two tabs (see detail A) of the grid frame into the two cavities (see detail B) on the back bottom side of the imaging unit.

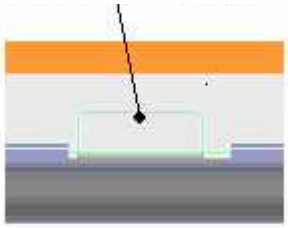


<Detail C>



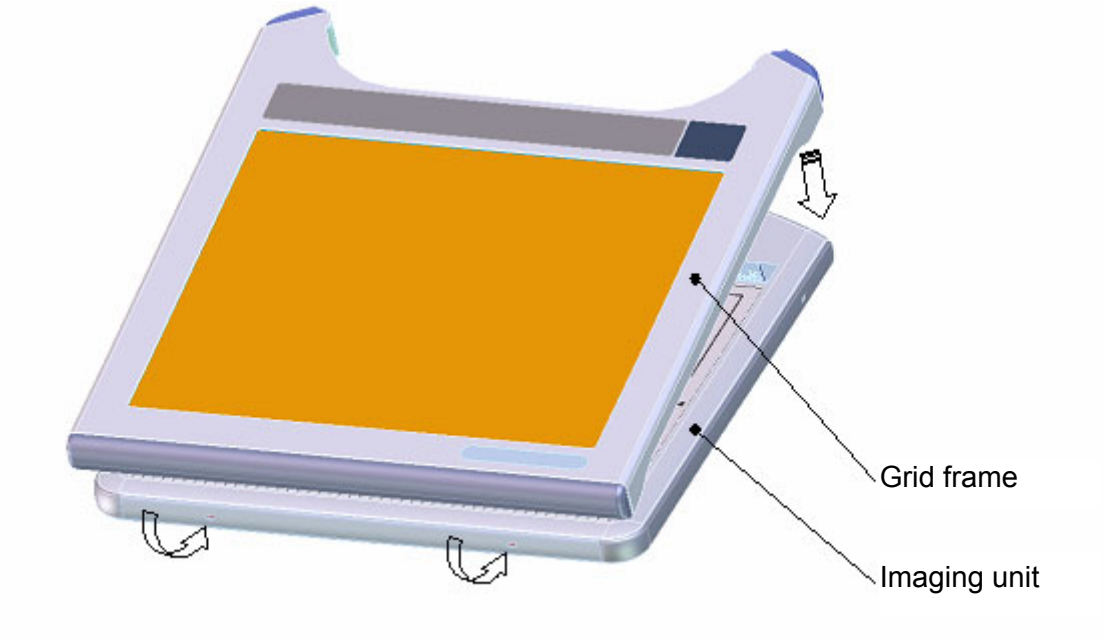
<View seen from reverse side of grid unit>





<Detail A>

3) Tilt the grid unit toward the imaging unit side, and fit the two anchoring hooks (see detail C) of the lock mechanism into the two cavities (see detail D) on the handle sides of the imaging unit.
*** Check that the anchoring hooks automatically fit into the cavities and lock.**



4.3 Checking the release of the installed grid unit

1) Place the imaging unit with the installed grid unit on a flat surface, and slide the two slide switches on the outer side of the lock mechanism toward the outside. This will cause the hooks fitted into the cavities of the imaging unit to be pulled up in tandem, and the lock to be released.
2) With the slide switches still slid, hold both sides of the grid frame, and separate it from the handle side of the imaging unit.
3) Separate the two tabs on the grid frame from the two cavities of the imaging unit, and check that they disengage.

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CXDI-60G/60C

5. Parts Catalog

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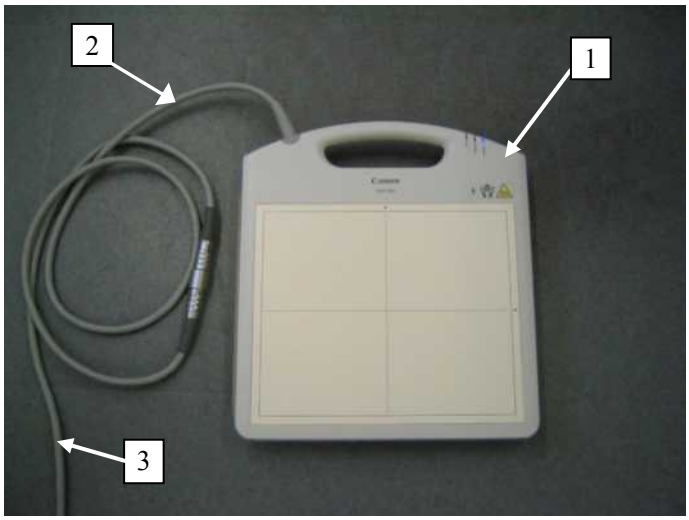
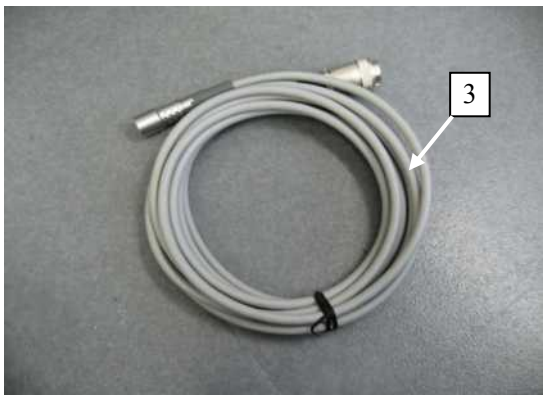
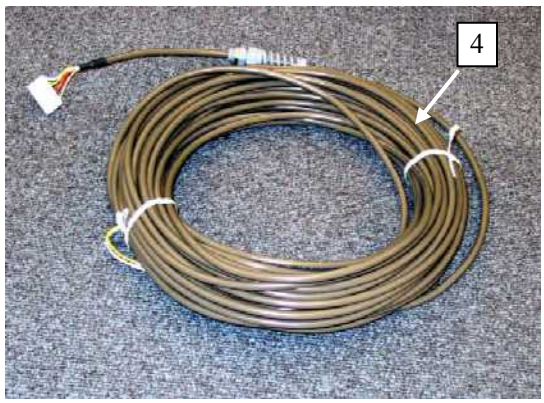
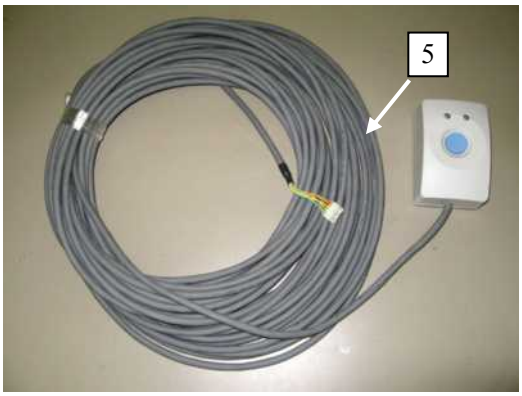
IMAGING UNIT (CXDI-60G/60C)

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	-	1	IMAGING UNIT	
2	BM7-0209-000	1	CABLE UNIT, SENSOR, SENSOR SIDE, S150-60	
3	BM7-0123-000	1	CABLE UNIT, SENSOR, POWER BOX SIDE, P630	
4	BH6-5728-040	1	CABLE UNIT, X-RAY I/F	
5	BM7-0052-000	1	SWITCH UNIT, REMOTE	CANON LOGO
	BM7-0083-000	1	SWITCH UNIT, REMOTE	NON LOGO









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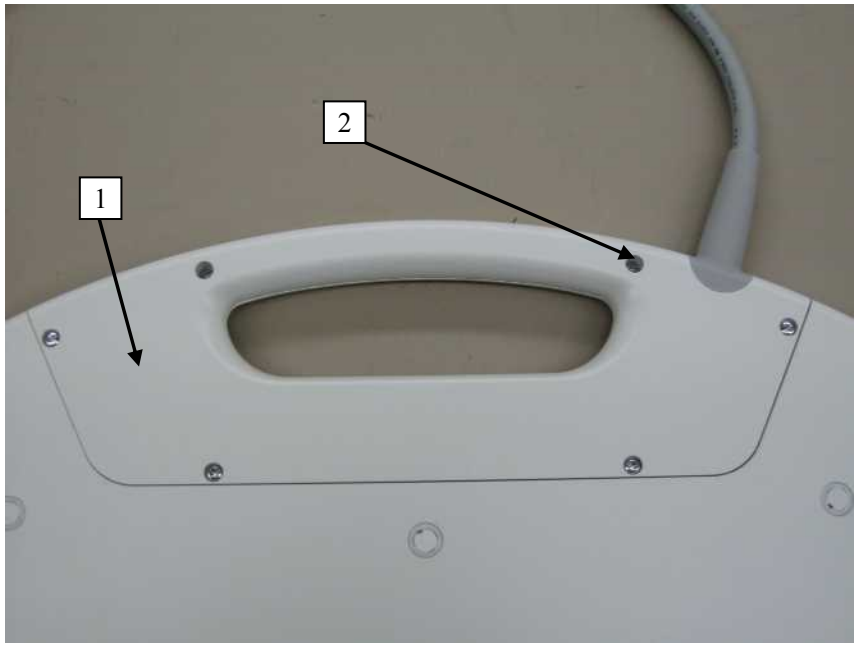
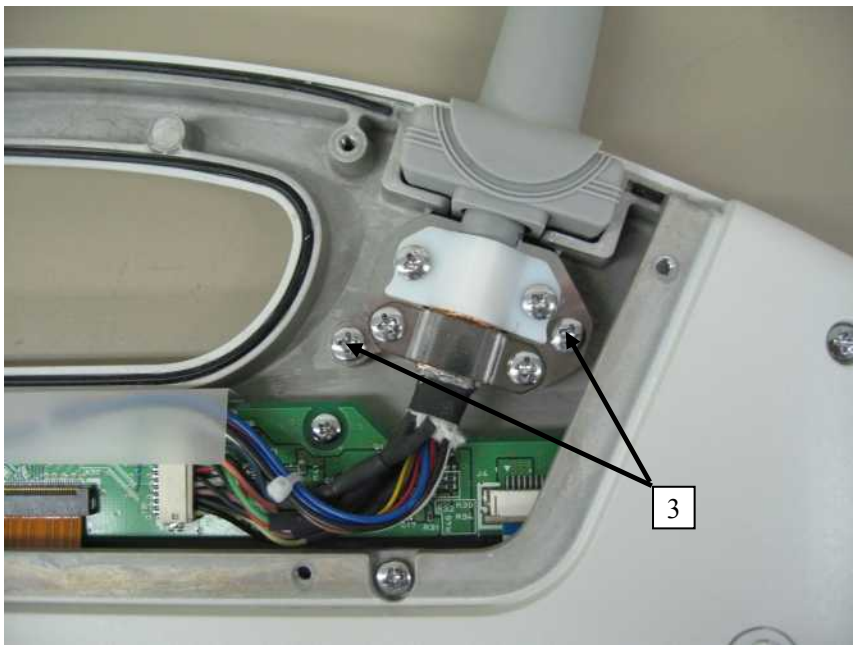
IMAGING UNIT (CXDI-60G/60C)

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	BA5-0269-000	1	COVER, ACCESS	
2	XB1-2300-606	6	SCREW	
3	XB1-2300-606	2	SCREW	





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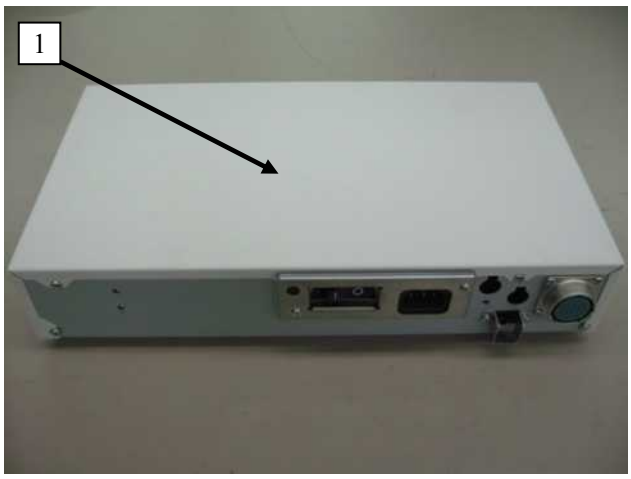
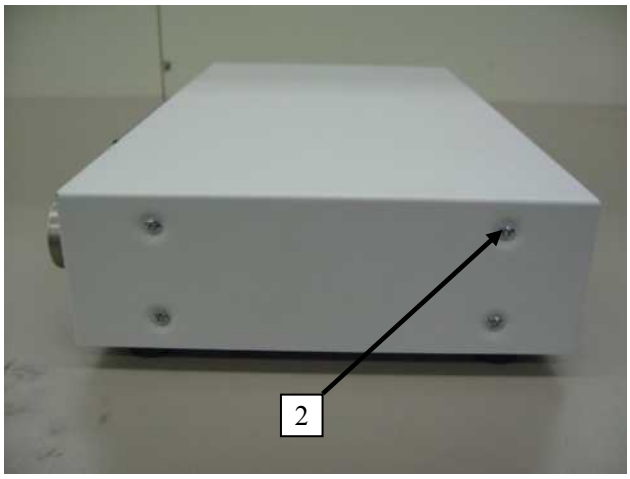
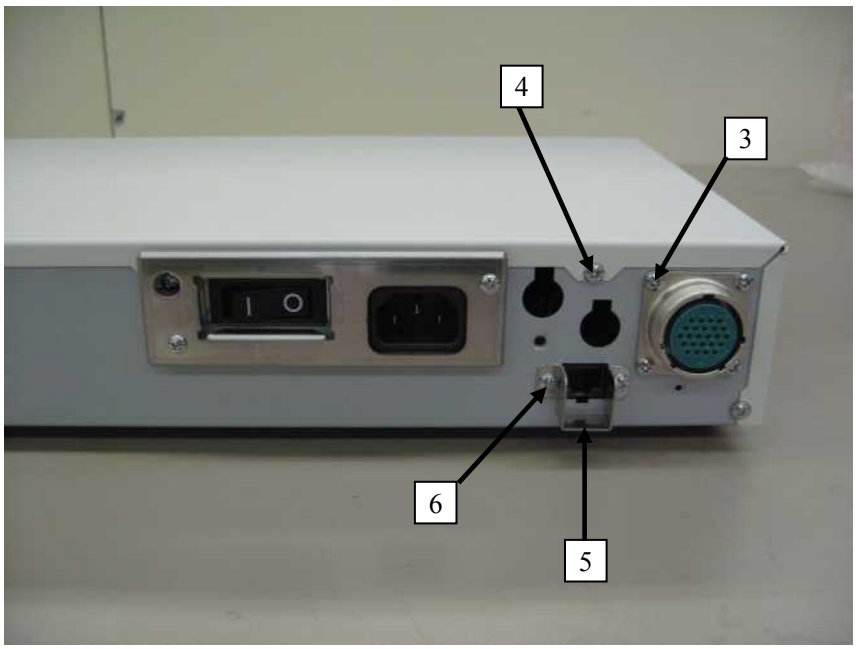
POWER BOX (CXDI-60G/60C)

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	BA5-0310-000	1	UPPER COVER, POWER BOX	
2	XB1-2300-406	8	SCREW	
3	XB1-2300-406	4	SCREW	
4	XB2-7300-606	5	SCREW, W/WASHER	
5	BA4-1802-000	1	COVER, CABLE	
6	XB1-2300-406	2	SCREW	







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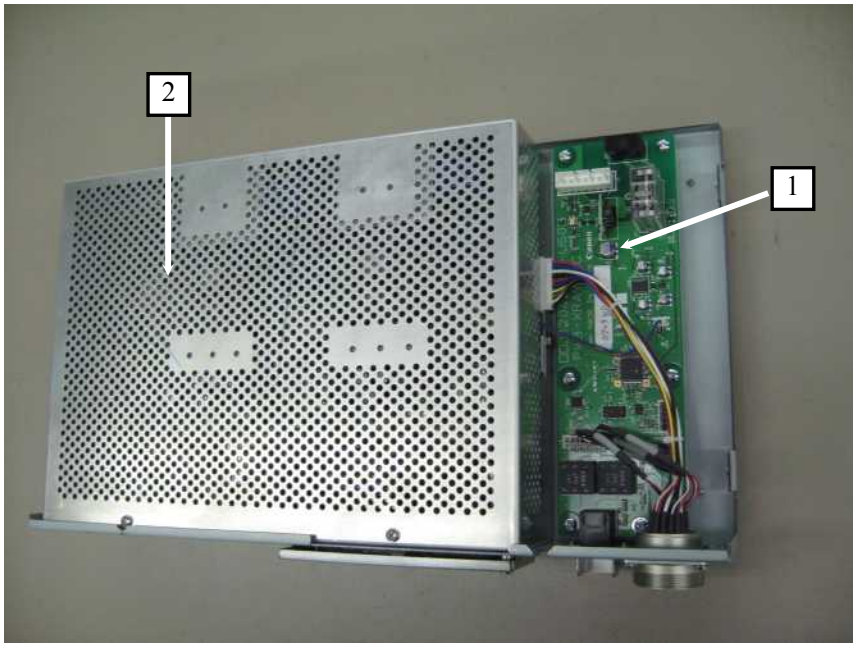
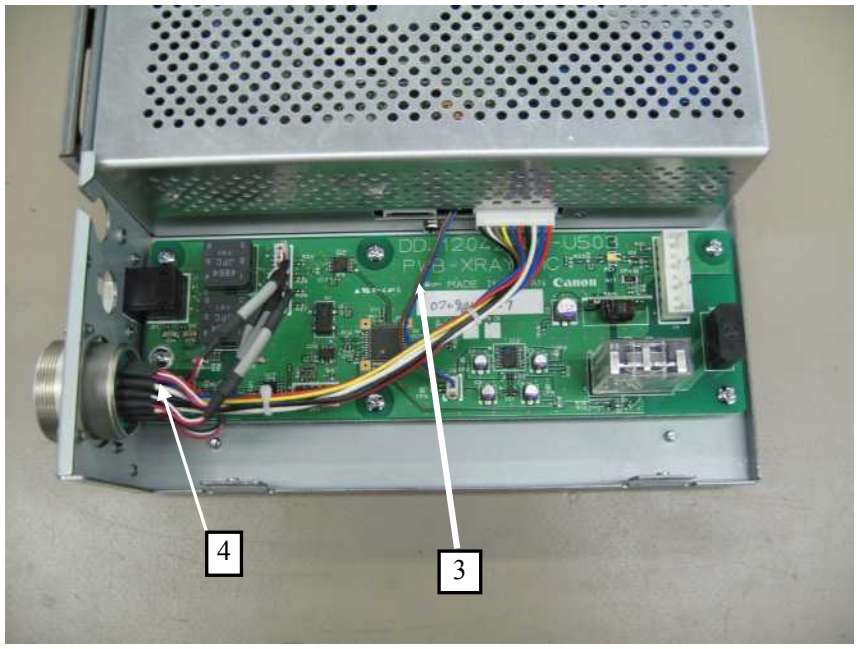
POWER BOX (CXDI-60G/60C)

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	BM7-0045-000	1	PCB UNIT,X-RAY I/F	
2	BH7-9051-000	1	POWER SUPPLY UNIT	
3	BM7-0046-000	1	CABLE UNIT, POWER SUPPLY	
4	BH7-9047-000	1	CABLE UNIT, DISTRIBUTION	





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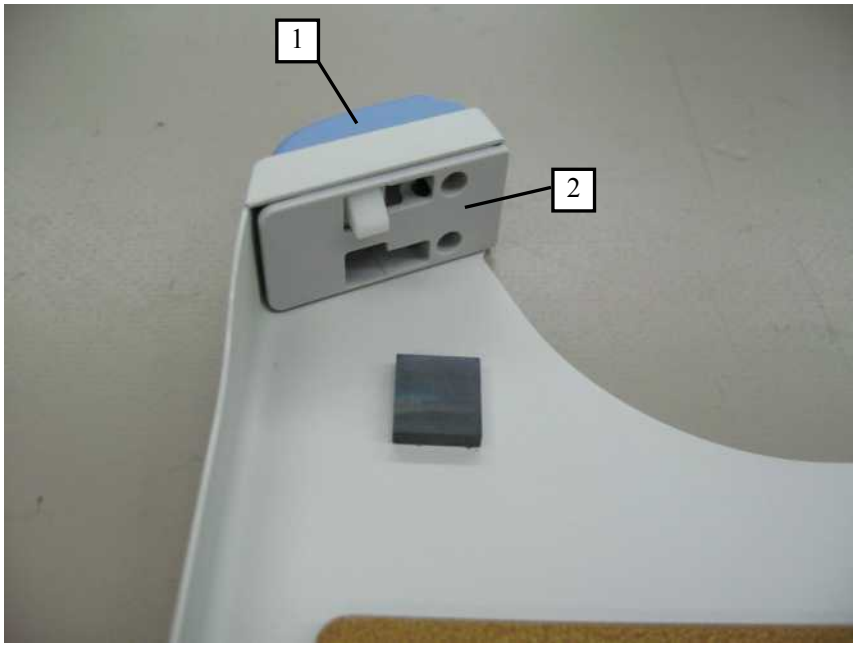
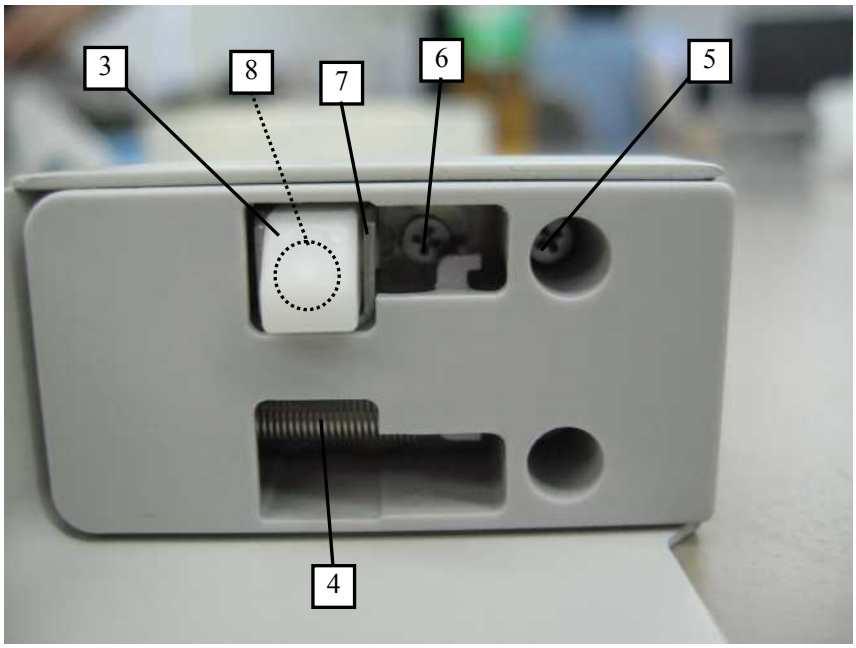
GRID UNIT (CXDI-60G/60C)

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	BA5-0316-000	2	SLIDE, LOCK	
2	BA5-0318-000	2	COVER, LOCK	
3	BA4-1820-030	2	HOOK, GRID	
4	BA4-1822-020	2	SPRING, SLIDE	
5	XA1-1260-406	4	SCREW	
6	XA1-1260-406	4	SCREW	
7	BA4-1819-030	2	BASE, HOOK SLIDE	
8	BA4-1821-020	2	SPRING, LOCK	





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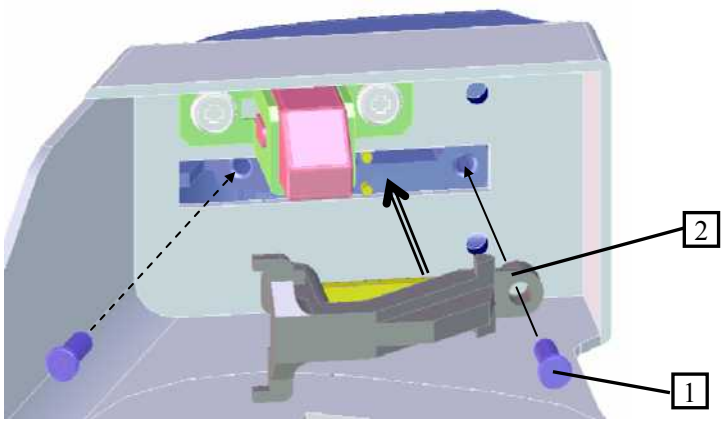
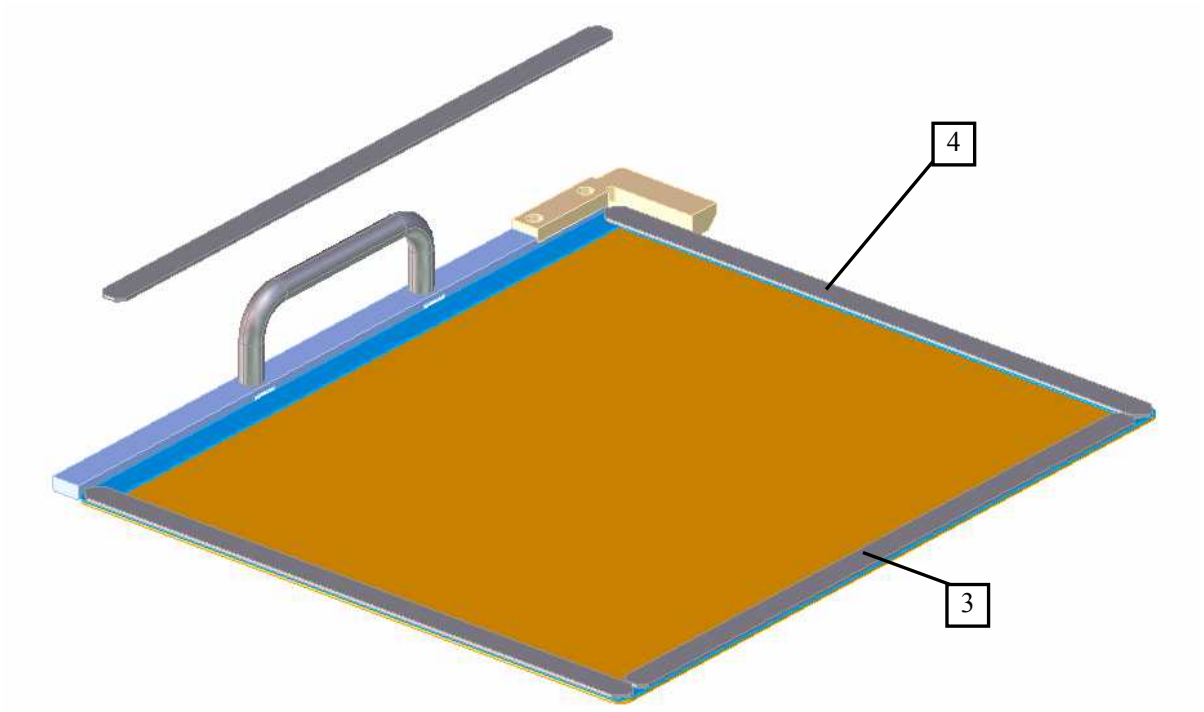
GRID UNIT (CXDI-60G/60C)

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	XA4-1200-609	4	SCREW	
2	BA5-0317-000	2	BASE, LOCK	
3	BA5-0322-000	2	SPACER, LONG (t = 1.5mm)	GRID 4:1
	BA5-0325-000	2	SPACER, LONG (t = 0.7mm)	GRID 8:1
	BA5-0328-000	2	SPACER, LONG (t = 0.3mm)	GRID 10:1
4	BA5-0323-000	2	SPACER, SHORT (t = 1.5mm)	GRID 4:1
	BA5-0326-000	2	SPACER, SHORT (t = 0.7mm)	GRID 8:1
	BA5-0329-000	2	SPACER, SHORT (t = 0.3mm)	GRID 10:1





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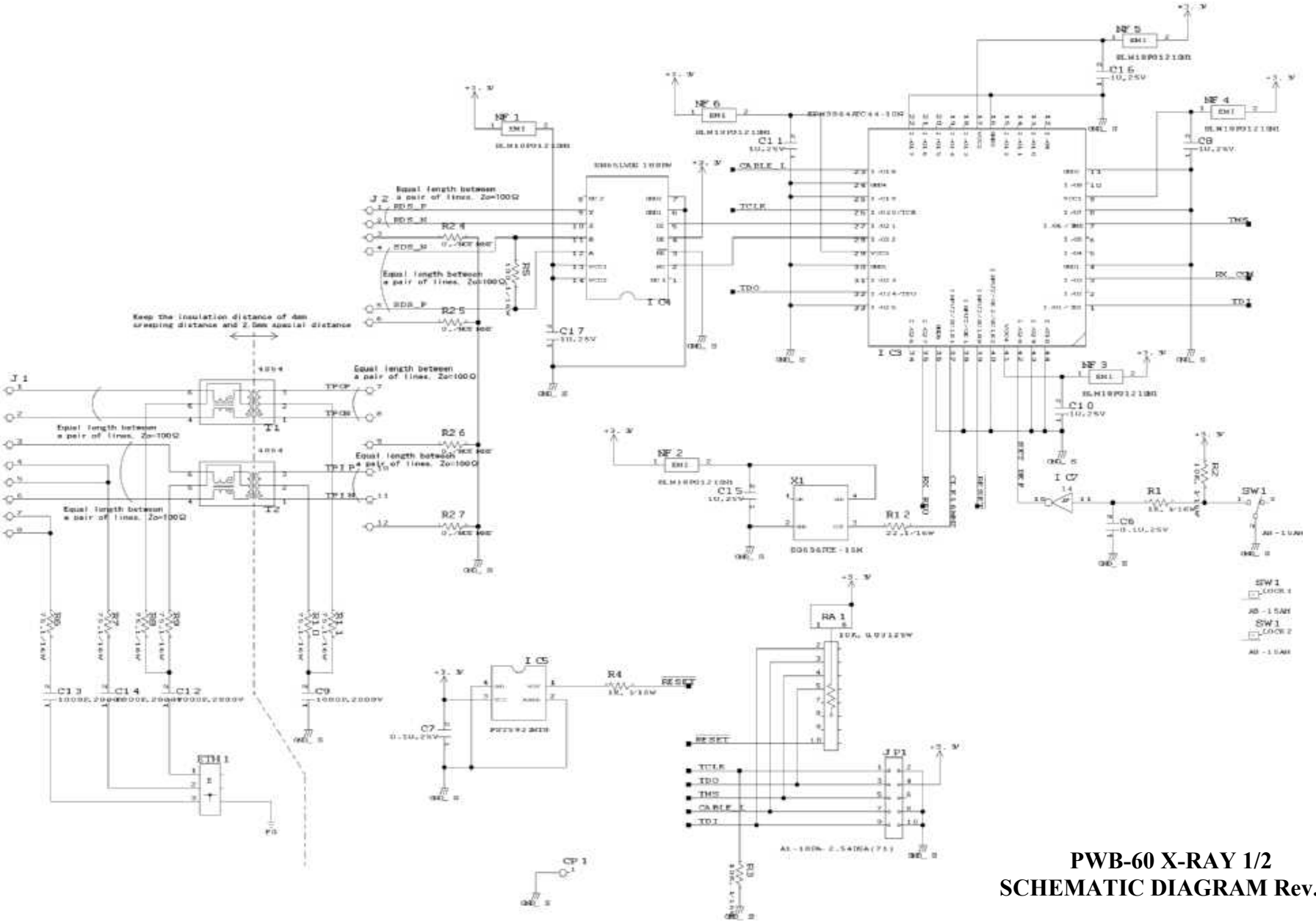

PWB-60 X-RAY 1/2
SCHEMATIC DIAGRAM Rev.01

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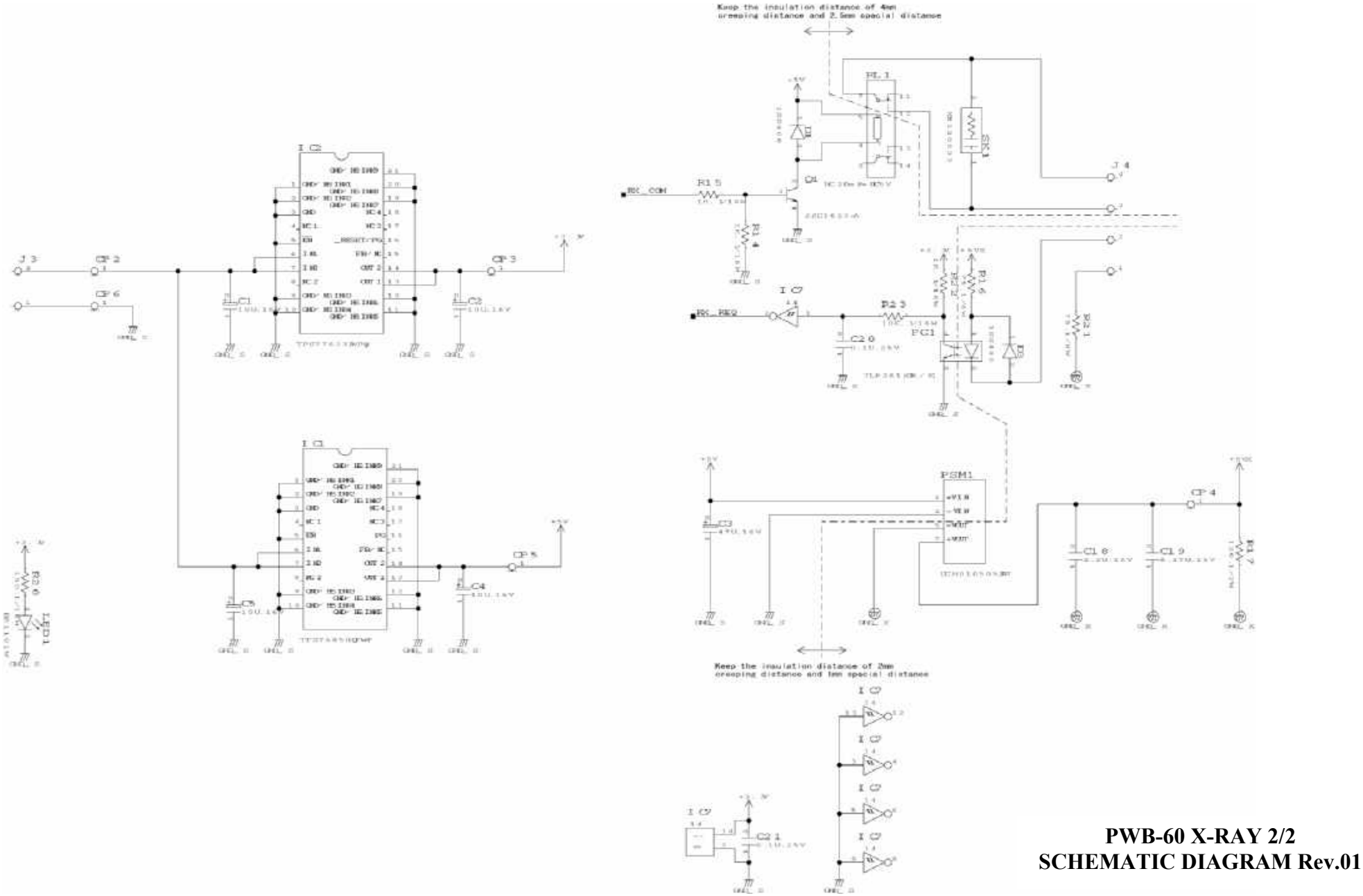

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CXDI-60G/60C

6. Troubleshooting

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1. Repair of the Imaging Unit

If there is something wrong with the imaging unit, follow the instructions in this chapter and return the imaging unit to Canon Inc. Canon Inc will decide whether to repair the imaging unit or not.

In this chapter, the primary-level response defined as the work carried out at the customer's site, the secondary-level response defined as the work at the office of the distributor (agent), and tertiary-level response defined as the work at Canon Inc.

1.1 Primary-Level Response

The primary-level response is defined as the work, which is carried out by medical engineers (ME) and service technicians at the customer's site (hospital). The connection of the cables should be checked first and replaced as needed. If the problem is found to be caused by the imaging unit, collect the necessary data and return to the imaging unit to the distributor's office.

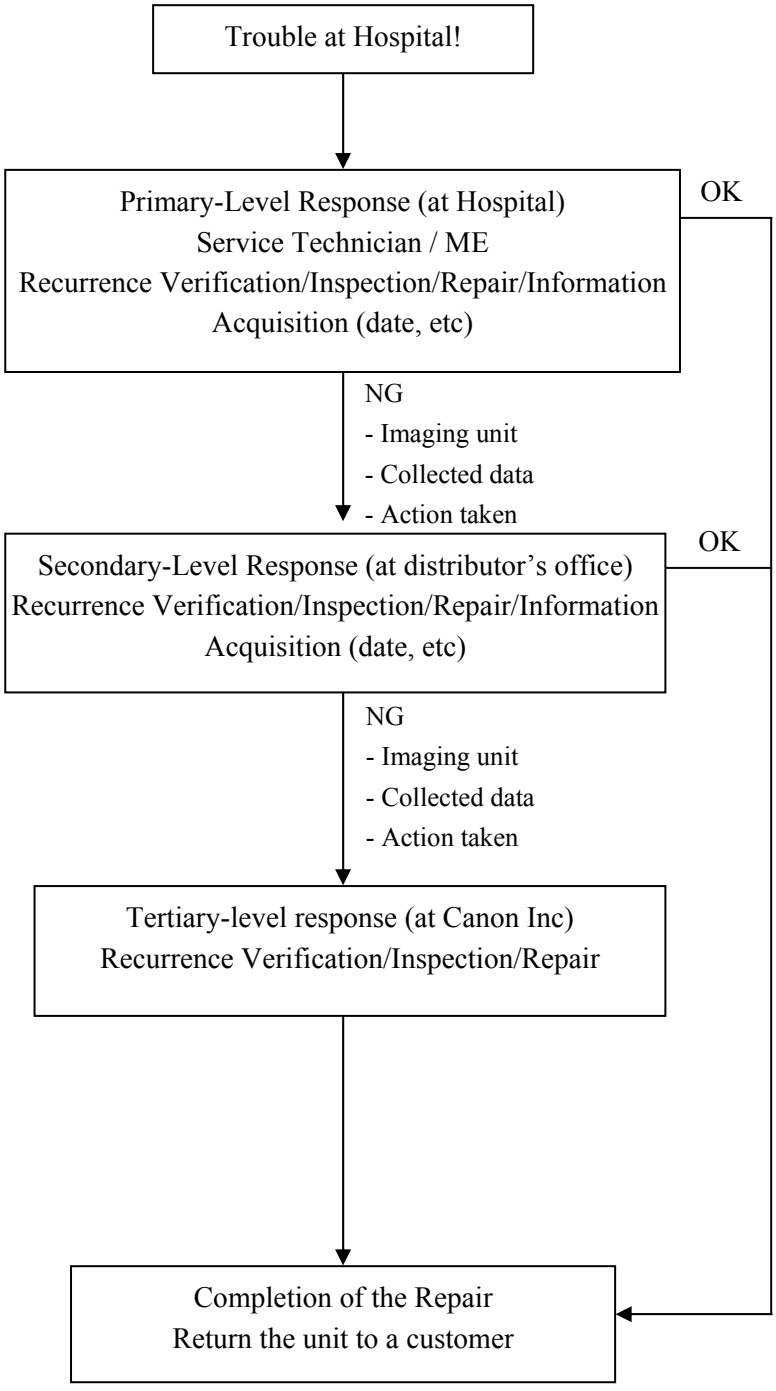
1.2 Secondary-Level Response

The secondary-level response is defined as the work (trouble recurrence verification and repairs), which is carried out by service technicians at the office of the distributor (agent). After it is confirmed that the problem is caused by the imaging unit, collect the necessary data at the office. Return to the imaging unit to the Canon Inc with the collected data and report to Canon Inc what action has been taken.

1.3 Tertiary-Level response

The tertiary-level response is defined as the work carried out at Canon Inc.
Canon Inc will conduct the trouble recurrence verification according to the collected data and the action taken by the secondary-level response. Canon Inc will make repairs after identifying the cause is the imaging unit.

2. Trouble Response Workflow



3. Primary-Level Response

The primary-level response is defined as the work which is carried out at the customer's site (hospital or clinic). Only medical engineers (ME) and service technicians are permitted to undertake this work. When service technicians are dispatched to the customer's site, they must take with them the sensor cables (for the imaging unit side) and a power box (and, if possible, an imaging unit and notebook PC).

[Troubleshooting when errors have occurred]

3.1 Steps to deal with errors occurring at CXDI software startup

(1) Execute the log gathering tool.
(2) Check the power cable connections.
(3) Check the imaging unit, power box, and blue lamp transmission of the remote switch.
(4) Check the LAN cable connection. (Connection port at FC-24VE/E21A side: LAN2)
(5) Check the LAN cable connection. (Connection port at power box side)
(6) Check the LAN cables used.
- Crossover cable: Connect directly between the control PC and power box.
- Straight cable: Used for the switching hub (for connecting a multiple number of imaging units).
- Category 5 or above

(7) Re-connect the sensor cable (connections at imaging unit and power box sides).
(8) Check the connection of the sensor cable (connections at power box side).
(9) Replace the sensor cable (at power box side).
(10) Conduct a ping test check (IP: 192.168.100.1*).
(11) Replace the power box.
(12) Replace the sensor cable (at imaging unit side).

The sensor cable (at imaging unit side) must be replaced only by a service technician who has completed the service training.
Steps (10), (11) and (12) must be performed by the service technician who has been dispatched to the customer's site.

If the error recurs after the steps outlined above have been taken, the imaging unit must be returned to the office of the distributor (agent).
The secondary-level response steps are then undertaken.

* When a secondary-level response is requested, the following information must be provided without fail:

- Details of how the system has been operated on-site (system configuration, optional software, etc.)
- CXDI software version
- Shock sensor statuses
- Files saved using the log gathering tool
- Frequency with which the problem occurs

3.2 Steps to deal with errors occurring during calibration

(1) Check the X-ray tube irradiation field of the X-ray generator.
(2) Check the exposure dosage.
(3) Execute the log gathering tool.
(4) Conduct the self-diagnosis test, and check the test results.
(5) Check the sensor cable (connections at imaging unit and power box sides) connections.
(6) Replace the sensor cable (at power box side).
(7) Replace the power box.
(8) Replace the sensor cable (at imaging unit side).

The sensor cable (at imaging unit side) must be replaced only by a service technician who has completed the service training.
Steps (7) and (8) must be performed by the service technician who has been dispatched to the customer's site.

If the error recurs after the steps outlined above have been taken, the imaging unit must be returned to the office of the distributor (agent).
The secondary-level response steps are then undertaken.

* When a secondary-level response is requested, the following information must be provided without fail:
  - Details of how the system has been operated on-site (system configuration, optional software, etc.)
  - CXDI software version
  - Shock sensor statuses
  - Files saved using the log gathering tool
  - Frequency with which the problem occurs

3.3 Steps to deal with errors occurring prior to ready transfer, during ready transfer, exposure and exposure standby

(1) Execute the log gathering tool.
(2) Check the sensor cable (connections at imaging unit and power box sides) connections.
(3) Replace the sensor cable (at power box side).
(4) Replace the power box.
(5) Replace the sensor cable (at imaging unit side).

The sensor cable (at imaging unit side) must be replaced only by a service technician who has completed the service training.
Steps (4) and (5) must be performed by the service technician who has been dispatched to the customer's site.

If the error recurs after the steps outlined above have been taken, the imaging unit must be returned to the office of the distributor (agent).
The secondary-level response steps are then undertaken.

* When a secondary-level response is requested, the following information must be provided without fail:
  - Details of how the system has been operated on-site (system configuration, optional software, etc.)
  - CXDI software version
  - Shock sensor statuses
  - Files saved using the log gathering tool
  - Frequency with which the problem occurs

Reference:
Refer to the SIDR-08-012 for the items to be checked and the instructions on how to handle the system error.

[Troubleshooting when abnormal images occur]

(1) Execute the log gathering tool.
(2) Check the calibration images (White*.dcm) on the monitor.
(3) Conduct the self-diagnosis test, and check the test results. (Calibration must not be performed.)
(4) Check whether the abnormal images recur.
- If the problem occurs with a high frequency: Proceed with X-ray exposure, obtain five abnormal images, and proceed to step (5).
- If the problem occurs with a low frequency: Obtain at least one abnormal image, and proceed to step (5).

  Note: When the problem occurs with a low frequency, X-ray exposure can be continued, but the effects of the heat may cause the X-ray tube to deteriorate so a waiting period must be provided during continuous exposure and the exposure undertaken while at the same time cooling down the X-ray tube.

(5) Replace the sensor cable (at power box side).
(6) Replace the power box.
(7) Replace the sensor cable (at imaging unit side).

The sensor cable (at imaging unit side) must be replaced only by a service technician who has completed the service training.
Steps (6) and (7) must be performed by the service technician who has been dispatched to the customer's site.

If the abnormal images recur after the steps outlined above have been taken, the imaging unit must be returned to the office of the distributor (agent).
The secondary-level response steps are then undertaken.
Even when the problem occurs with a low frequency, at least one abnormal image must be obtained.

* When a secondary-level response is requested, the following information must be provided without fail:
- Details of how the system has been operated on-site (system configuration, optional software, etc.)
- CXDI software version
- Shock sensor statuses
- All the images described as abnormal by the user as well as the images (2 or 3 of them) taken immediately before and immediately after each abnormal image
- Abnormal images (1 to 5 of them) obtained by replication exposure
- Files saved using the log gathering tool
- Frequency with which the problem occurs

Reference:
For details on the procedure for gathering the files when image problems occurs, refer to SIDR-08-003.

4. Secondary-Level Response

The secondary-level response is defined as the work (trouble recurrence verification and repairs) which is carried out at the office of the distributor (agent). The sensor cable (at imaging unit side) must be replaced only by a service technician who has completed the service training. The only external parts whose removal is permitted are the access covers.

[Troubleshooting when errors have occurred]

4.1 Steps to deal with errors occurring at CXDI software startup

(1) Check for the existence of the data which was acquired at the primary-level response stage. Data must be acquired if it is insufficient in any way.
(2) Connect the system using the loaner system (imaging unit, power box and cables) of the distributor (agent). Make sure to check that the loaner system works normally.
(3) Replace the loaner imaging unit of the distributor (agent) with the faulty unit which repair has been requested for.
(4) Check whether the error recurs. If the error recurs, proceed to step (5).
    · If the error fails to occur, it means the imaging unit is problem-free so return it to the installation site.
(5) Check the sensor cable (connections at imaging unit and power box sides) connections.
(6) Replace the sensor cable (at imaging unit side). (Do this if it was not done at the primary-level response stage.)
(7) Start up the host, and check whether the error recurs.

If the error recurs after the steps outlined above have been taken, the imaging unit must be returned to Canon Inc.
The tertiary-level response steps are then undertaken.

* When a tertiary-level response is requested, the following information must be provided without fail:
    · Details of how the system has been operated on-site (system configuration, optional software, etc.)
    · CXDI software version
    · Shock sensor statuses
    · Frequency with which the problem occurs
    · Data acquired at the primary-level response stage
    · Entry of what action was taken at the secondary-level response stage (enter these details on the inquiry sheet and send off the sheet)
    · Data (D:¥CCR) acquired at the secondary-level response stage

4.2 Steps to deal with errors occurring during calibration

(1) Check for the existence of the data which was acquired at the primary-level response stage. Data must be acquired if it is insufficient in any way.
(2) Connect the system using the loaner system (imaging unit, power box and cables) of the distributor (agent). Make sure to check that the loaner system works normally.
(3) Replace the loaner imaging unit of the distributor (agent) with the faulty unit which repair has been requested for.

(4) Check whether the calibration error recurs. If the error recurs, proceed to step (5).
  · If the error fails to occur, it means the imaging unit is problem-free so return it to the installation site.
(5) Check the sensor cable (connections at imaging unit and power box sides) connections.
(6) Replace the sensor cable (at imaging unit side). (Do this if it was not done at the primary-level response stage.)
(7) Proceed with calibration, and check whether the error recurs.

If the error recurs after the steps outlined above have been taken, the imaging unit must be returned to Canon Inc.
The tertiary-level response steps are then undertaken.

* When a tertiary-level response is requested, the following information must be provided without fail:
  · Details of how the system has been operated on-site (system configuration, optional software, etc.)
  · CXDI software version
  · Shock sensor statuses
  · Frequency with which the problem occurs
  · Data acquired at the primary-level response stage
  · Entry of what action was taken at the secondary-level response stage (enter these details on the inquiry sheet and send off the sheet)
  · Data (D:¥CCR) acquired at the secondary-level response stage

4.3 Steps to deal with errors occurring prior to ready transfer, during ready transfer, during X-ray exposure and during exposure standby

(1) Check for the existence of the data which was acquired at the primary-level response stage. Data must be acquired if it is insufficient in any way.
(2) Connect the system using the loaner system (imaging unit, power box and cables) of the distributor (agent). Make sure to check that the loaner system works normally.
(3) Replace the loaner imaging unit of the distributor (agent) with the faulty unit which repair has been requested for.
(4) Check whether the error recurs. If the error recurs, proceed to step (5).
  · If the error fails to occur, it means the imaging unit is problem-free so return it to the installation site.
(5) Check the sensor cable (connections at imaging unit and power box sides) connections.
(6) Replace the sensor cable (at imaging unit side). (Do this if it was not done at the primary-level response stage.)
(7) Check whether the error recurs.

If the error recurs after the steps outlined above have been taken, the imaging unit must be returned to Canon Inc.
The tertiary-level response steps are then undertaken.

* When a tertiary-level response is requested, the following information must be provided without fail:
  - Details of how the system has been operated on-site (system configuration, optional software, etc.)
  - CXDI software version
  - Shock sensor statuses
  - Frequency with which the problem occurs
  - Data acquired at the primary-level response stage
  - Entry of what action was taken at the secondary-level response stage (enter these details on the inquiry sheet and send off the sheet)
  - Data (D:¥CCR) acquired at the secondary-level response stage

*** Concerning error problems**

Error problems may also include problems in the control computer so when an error has occurred, it must be checked on the error code list of the CXDI software. A tertiary-level response may be requested only when it is clear that the cause of the error can be traced to the imaging unit.

As a basic rule, requests for a tertiary-level response will not be accepted for an imaging unit if the error concerned did not recur at the secondary-level response stage.

Reference:
For details on the items to be checked and the handlings workflows when system error occurs, refer to SIDR-08-012.

[Troubleshooting when abnormal images occur]

(1) Check for the existence of the data which was acquired at the primary-level response stage. Data must be acquired if it is insufficient in any way.
(2) Check the abnormal images acquired at the primary-level response stage on the monitor.
(3) Conduct the self-diagnosis test, and check the test results.
- Before proceeding with the self-diagnosis test, calibration must not be performed under any circumstances. This is to prevent the calibration data to be gathered from being updated before it is copied into the logs folder.
  Even with the instructions followed when initially responding to the trouble, bear in mind that the self-diagnosis must be performed first and that calibration is to be undertaken after this.

(4) Check whether the abnormal images recur.
- If the problem occurs with a high frequency: Proceed with X-ray exposure, obtain five abnormal images, and proceed to step (5).
- If the problem occurs with a low frequency: Obtain at least one abnormal image, and proceed to step (5).
  Note: In order to prevent deterioration of the X-ray tube during continuous exposure, a waiting period must be provided.

(5) Replace the sensor cable (at imaging unit side). (Do this if it was not done at the primary-level response stage.)

If the error recurs after the steps outlined above have been taken, the imaging unit must be returned to Canon Inc. The tertiary-level response steps are then undertaken.

However, as a basic rule, requests for a tertiary-level response will not be accepted for an imaging unit if the error concerned did not recur at the secondary-level response stage. (Further consultations must be held with the representatives of Canon Inc.)

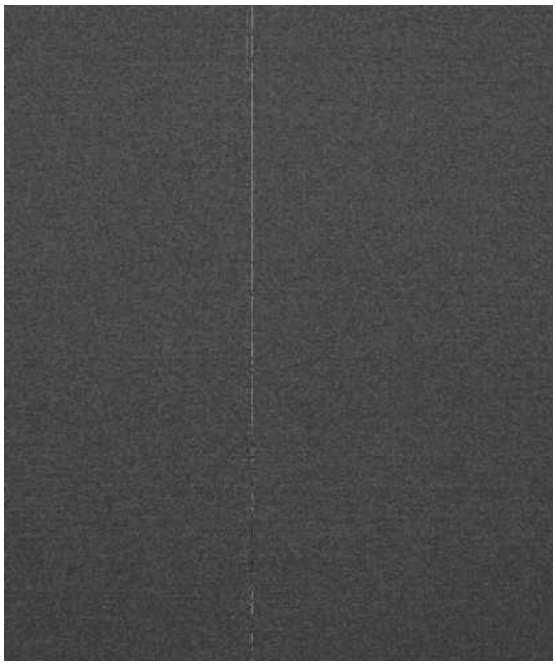
* When a tertiary-level response is requested, the following information must be provided without fail:
- Details of how the system has been operated on-site (system configuration, optional software, etc.)
- CXDI software version
- Shock sensor statuses
- All the images described as abnormal by the user as well as the images (2 or 3 of them) taken immediately before and immediately after each abnormal image
- Abnormal images (1 to 5 of them) obtained by replication exposure
- Frequency with which the problem occurs
- Data acquired at the primary-level response stage
- Entry of what action was taken at the secondary-level response stage (enter these details on the inquiry sheet and send off the sheet)
- Data (D:¥CCR) acquired at the secondary-level response stage

Reference
For details on the procedure for gathering the files when image problems have occurred, refer to SIDR-08-003.

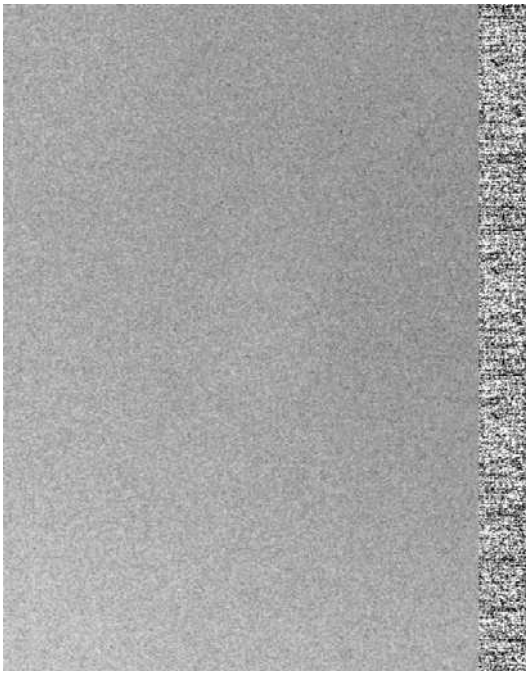
4.4 Examples of abnormal images

It is difficult to take remedial action on the market for the abnormal images shown below. The problems involved preclude the possibility of repairs even when the sensor cable, power box or other parts are replaced.

(1) Continuous multiple line defects



(2) Artifacts in a block



5. Gathering Information About the Problem

It is recommended to replace the whole unit (imaging unit, power box) if any problem occurs at the customer's site in order to reduce the downtime of the system.

It is desirable to have the bad unit brought back and repaired at the office of the distributor (agent). (Although it depends on the kind of the problem.)

This section explains about the information (log file) required to know what has occurred and what to be done.

[Probable problems]

- System connection failure and condition setting failure during installation.
- Electrical and mechanical system failure, malfunctioning, bad image, noise, and communication error
- Software and specifications problem

[Required Information]

*Required log file

Execute the log collection tool to save the following files.

(1) Environmental information (such as version of the CXDI software, composition of hardware, optional software and the versions of software)

(2) Dr. Watson log

C:\Documents and Settings\All Users\Application Data\Microsoft\Drwatson\drwts32.log

(3) Event viewer system log

C:\WINDOWS\system32\config\SysEvent.Evt

(4) The whole D:\Ccr folder

Reference:
For details on the procedure for gathering the files when image problems occurs, refer to SIDR-08-003.

6. How to Back-up and Recover the System

[Objective]

This document describes how to back up and recover the system.

[Technical Description]

There are two system backup methods as follow:

The recovery method required depends on the way the system crashes.

Backup method

A) Backup using floppy disks

B) Backup using a hard drive

6.1 Backup method

A) Backup method using floppy disks

The network settings configured in each installation site and the customized body part settings are stored in each ini file.

All the ini files are stored on a floppy disk when starting up the control PC.

The system has a feature that stores the latest ini files on the floppy disk at the system startup by updating the ini files with modifications users made while using the system.

B) Backup method using a hard drive

The control PC has no feature that mirrors all the files including the OS to other hard drives.

Therefore, to be ready for hard drive crashes, we recommend that you add another hard drive when installing the system, in order to copy the software between the hard drives using Ghost or Drive Copy, which are available on the market.

This should be conducted at the final installation stage (just before delivery to users).

As an alternative, you can also provide a hard drive that contains the OS (before activation) and drivers in case of hard drive crashes.

6.2 Recovery method

6.2.1 When problems occur in a CXDI software ini file

The system can be recovered to the last environment status just before the system was used by users when problems[*1] occur in d:\Ccr software other than the OS.

[*1] When the setting data or files are damaged

In this case, the recovery can be made by overwriting ini files stored on the floppy disk to d:\ccr.

6.2.2 When problems occur in CXDI software

When problems occur in files other than ini files for d: \Ccr software other than the OS, recovery can be accomplished by adding or replacing the relevant files if you can identify the defective files. Recover Ccr with the following procedure if you cannot identify the defective files:

1) Copy d: \ccr to a different directory or laptop computer.
2) Delete d: \ccr, and then newly install the CXDI software. (Note)

   (Note) The same version of the software must be installed.
3) Copy the following files in Ccr that were copied in Step 1) to d: \ccr

   \dtstore (captured images)

   \Logs

   \White#.dcm

   \defpix#.dat

   \xxxxxx.dp
4) Newly install the optional software (DMW/Gen.communication) if you are using it.
5) Copy to overwrite all the ini files in d: \Ccr stored on the floppy disk in order to recover the user's environment.
6) Perform the settings again that are described in the "Control PC serial number" and "Setting the imaging unit identification and the number of connecting units" in this manual "Setting Procedures".

6.2.3 When the hard drive crashes

Recover the system using the following method when the hard drive crashes.

1) Replace the crashed hard drive with the hard drive provided in item B above, “Backup method using a hard drive”.

   * Copy \Ccr from the original hard drive to the new hard drive when the D drive in the crashed hard drive is in a normal state (a problem case caused by the OS).

   Note: Perform Step 2 after upgrading if the CXDI software version you are using is newer than that in the hard drive provided by copying from hard drive to hard drive during system installation.

   (Files such as StrTable.ini are not compatible when the CXDI software version is different.)

   * When the hard drive has crashed mechanically, proceed to Step 2 and subsequent steps.

2) After replacement, copy to overwrite all the ini files stored on the floppy disk to d:¥ccr in order to recover the user’s environment.

   Note that images captured by users cannot be inherited in this case.

   Note: Calibration is required when the system has been used for over one year.

   Note: Perform Step 2 after upgrade if the CXDI software version you are using is newer than that in the hard drive provided by copying from hard drive to hard drive during system installation.

   (Files such as StrTable.ini are not compatible when the CXDI software version is different.)

6.2.4 When problems occur in driver software

When drivers such as the touch panel driver are damaged, reinstall the appropriate drivers by referring to “C3S Service Manual”.

-Reference-

The following describes Windows XP activation for your reference.

(Note that this information is based on a test and information posted on Web bulletin boards because Microsoft does not provide an official document for this.)

1. With or without reactivation required

Modification	1. With or without reactivation required	Description
Reinstalling OS without hard drive formatting required	Not required	
Reinstalling OS with hard drive formatting required	Required	Because an install ID stored in the hard drive is cleared.
Replacing a mother board	Probably required	Depends on the number of on-board devices.
Move a hard drive to a different machine	Required	Due to being regarded as anything other than the hard drive being modified.
Changing external devices	Not required	Due to recognizing the PC's internal configuration only.
Adding hardware components	Not required	Only replacement of components that existed at the time of first activation is detected. Adding components is a different category.

2. Hardware components related to activation

· Display adapter (video board)
· SCSI adapter
· IDE adapter
· Network adapter (MAC address)
· Within the amount of mounted physical memory
· Processor type
· Processor serial number
· Hard disk interface
· Hard disk volume serial number
· CD-ROM/CD-RW/DVD-ROM

3. The number of changed components that require no reactivation

· Without network interface: Changes up to four elements
· With network interface: Changes up to six elements

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CXDI-60G/60C

7. Service Manual Report

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CXDI-60G/60C

8. Tools

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ISSUED ON: July 2009

SPECIAL TOOL LIST

MODEL: CANON DIGITAL RADIOGRAPHY CXDI-60G/60C

BINDER: SERVIC MANUAL FOR CXDI-60G/60C

FILE NO. **1/1**

TOOL NO.	TOOL NAME	Q'TY	REMARKS
BY9-6583-000	STICKING TOOL, GRID For CXDI-60G/60C	1	(If necessary)
BY9-6585-000	WEIGHT TOOL, GRID For CXDI-60G/60C	1	(If necessary)

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CXDI-60G/60C

9. Appendix

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< I n s p e c t i o n I t e m s >

ITEM	Category	NO	Item	Characteristics values	Test means	Record
1	Imaging unit	1	Grid installation	It must be possible to install and remove the grid smoothly, and the grid must securely lock and unlock.	Touch	
		2	Grid/no grid detection	Whether the grid is present or not must be properly detected.	Visual check	
		3	Sensor cable	The cable must not be flattened or twisted and its covering must not be damaged.	Visual check	
		4	Sensor cable relay connector	The connector must be connected securely, and there must be no play.	Visual check, touch	
		5	Shock sensor	The sensor must detect shocks and not turn red.	Side panel right	
					Side panel left	
					Bottom panel right	
					Bottom panel left	
		6	Firmware version	-	Visual check	Ver.
		7	PLD code version	-	Visual check	Ver.
		8	Imaging unit IP address	-	Visual check	
2	Power box	1	Connector	The connector must be connected securely.	Visual check, touch	
		2	Power switch	It must be possible to set this switch to its ON and OFF positions properly.	Visual check, touch	
		3	POWER LED	The LED must light when the power is on.	Visual check	
		4	ERROR LED	The LED must not light when the power is on.	Visual check	
				The LED must light when the power is on while the sensor cable is disconnected from the detachable connector.		
3	Remote switch	1	Remote switch	It must be possible to set this switch to its ON and OFF positions properly.	Visual check	
		2	POWER LED (Power Box must be turned on.)	The LED must light when the power is on.	Visual check	
		3	ERROR LED POWER LED (Power Box must be turned on.)	The LED must not light when the power is on.	Visual check	
				The LED must light when the power is on while the sensor cable is disconnected from the detachable connector.	Visual check	
4	Control PC	1	Connector	The connector must be connected securely.	Visual check, touch	

< I n s p e c t i o n I t e m s >

ITEM	Category	NO	Item	Characteristics values	Test means	Record
5	System connections	1	Startup	The system power must come on when the power of the control PC is turned on.	Visual check	
		2	CXDI Software startup	The system must start up with no errors.	Visual check	
		3	Status lamps	The lamps must provide the correct indication that corresponds to the sensor statuses.	Visual check	
		4	Shutdown	The system power must go off when the power of the control PC is turned off.	Visual check	
6	Calibration	1	X-ray generator settings	The conditions under which calibration is implemented must be noted.	Visual check	kV mA msec
		2	Filter	Filter type	Visual check	
		3	Calibration processing	“Calibration completed successfully.”	Visual check	
7	Self-diagnosis	1	Self-diagnosis pass/fail	Tests 1 to 5 must be passed.	Visual check	TEST1 TEST2 TEST3 TEST4 TEST5
8	Image quality	1	Phantom exposure	There must be no artifacts, shading, grid stripes, etc.	Visual check	
9	Transmission test	1	Dcap, 200 times	Transmission must be successful.	Dcap.exe	
10	Ping test	1	Ping, 100,000 times	Communication must be successful.	Pingtest.exe	
11	PC-related items	1	Dirt, dust inside PC	There must be no dirt or dust.	Visual check	
		2	Event logs Application logs Watson logs	There must be no errors (excluding errors which have been dealt with).	Visual check	
		3	System logs OPU3 logs	There must be no errors (excluding errors which have been dealt with).	Visual check	
		4	Touch panel	There must be no deviation or other problems.	Visual check	
		5	Date, time	The date and time must be correct.	Visual check	
		6	CXDI software version	-	Visual check	Ver.
		7	CCR folder backup	-	External media, etc.	
12	System exterior	1	Dirt	There must be no dirt.	Visual check	
13	Final checks	1	Hookup with RIS, patient data terminals	It must be possible to transmit and receive the data correctly.	Visual check	
		2	Exposure information, patient data in film server	There must be no errors in the information or data.	Visual check	
		3	X-ray generator, RIS and other equipment	The equipment must be the same as before the inspection work.	Visual check	